# ELECTRICAL REVIEW

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### A GREAT CLUB DINNER.

#### The Most Successful and Enjoyable Electric Club Banquet Ever Held.

A DISTINGUISHED ASSEMBLAGE LISTENS TO WITTY SPEECHES BY BRILLIANT MEN FROM BOTH CONTINENTS.

The handsome home of the Electric Club, 17 East Twenty-second street, was in gala attire on the evening of Thursday, October 2d, the occasion being the inauguration of the season of meetings of 1890-91 by a club dinner, which members and their guests attended to the number of 120. The house had been recently renovated, and, with the club servants in neat, new liveries of blue and gold, presented a truly holiday appearance.

On entering the hallway, brilliantly lighted by incandescent lamps, the eye was first attracted by a handsome floral device representing the Eiffel tower surmounted by a full size arc lamp. On the faces of the base were the words "Science," "Progress," "Art," "Industry." This beautiful design was sent to the Electric Club with the compliments of Dr. J. B. de Lery, and was seen and greatly admired by all.

Members and their friends began to arrive about half past six, and from that time on a constant stream of men in evening clothes kept coming in. About seven o'clock, Gen. Oscar E. Madden, president of the club, put in his appearance and was greeted with a cheer and salvos of hand clapping.

The large parlors and dining room had been thrown into one, making a handsome banquet hall, round which the tables were placed in the form of an elongated O with the head at the front of the room. The table appointments were superb, and an abundance of flowers lent fragrance and beauty to the scene,

About 7.30 General Madden led the way to the feast and took his place at the head of the table. Ranged on either side of him were the vice-presidents and other officers of the club, and the more prominent guests. At each plate plate was a delicate boutonnière. An electric car and a scene in a telephone subscriber's office were works of art in confectionery placed on either side of the president. At a signal from General Madden, after each guest had found his place, a flood of electric light was turned upon the room which had been semi-brilliant all the time. The cut glass and silver reflected the bright beams of incandescent light and the smiles of the guests, a mandolin orchestra played entrancing airs which floated out upon the air from some hidden nook, while the following delicate *menu* was being served:

MENU.

Oysters, half shell.

Potage.—Chicken Gumbo.
Hors D'Oeuvres.—Olives, Radis, Celery, Salted Almonds.
Poisson.—Broiled Spanish Mackerel, Cucumber Salad.
Relevé.—Filet of Beef, champignons aux truffes; String Beans.
Sorbet.—Punch, Electric.
Roti.—Partridge aux cresson, Salade de laitue.
Glace.—Glace fantaisie; Biscuit, Edison.
Dessert.—Fancy Cakes, Bonbons.

Fromage et Grisini.

Café.

B. & G. Sauterne, Pommard, Champagne, Cognac, Chartreuse.

Just as the champagne began to flow the attention of the assemblage was arrested by the stirring notes of the "Marsellaise," which came from—no one knew where. In silent interest questioning faces turned here and there trying to discover the source of the music. It was finally noticed that a long distance telephone receiver had been cleverly concealed in each of the two electroliers, and, beginning at the Long Distance Telephone headquarters, 18 Cortlandt street, the strains of the orchestra were gathered up and passed along the copper wires to the banquet hall where they burst upon the ear as distinctly as though the instruments were but a few feet away. The music was met with great applause, and an encore unanimously demanded. This was given to the delight of the listeners, the number being a cornet solo: "When Other Lips and Other Eyes, etc."

When coffee had been served and cigars lighted, President Madden, who acted as toast-master, in a few appropriate remarks called upon Mr. Henry C. Davis, the first president of the Electric Club. Mr. Davis spoke interestingly and feelingly of the growth of the club, from a very small beginning, and hoped it would continue in the good work it had done in the past, in uniting in friendly bonds the many representatives of rival electrical interests.

Judge Taylor, of Indiana, was next called upon. He said he felt on this occasion like one of the men in the parable who were called in to fill up the places at the rich man's feast. It was his first experience at an Electric Club dinner, and he was glad he came. He closed his remarks with a graceful tribute to the club, its home and guests.

General Madden then called upon Mr. Grosvenor P. Lowrey, one of the vice-presidents of the club, and said that as he had not been present at very many club meetings he would call upon him as a punishment, and that no subject had been assigned to him. Mr. Lowrey responded in a particularly happy vein, saying that he thought it would be the innocent audience which would suffer the punishment. General Madden had not assigned him a subject; being a lawyer he was accustomed always to keep both the topic and the fee in view. He felt that in this instance he was like Mr. Nathaniel Hawthorne, whom he resembled in no other respect, when he was called upon for a speech on one occasion in England. Hawthorne said he got upon his legs (Mr. Lowrey had observed that gentlemen sometimes had had difficulty in doing this when called upon after dinner), rapped upon his mind and it gave forth a hollow sound. Referring to Mr. Taylor's remarks, he said he didn't know how familiar they were with the Scriptures out in Indiana, but here in New York we remembered them, especially the parable of the rich man's feast, and the Electric Club was run on truly scriptural principles.

He agreed with ex-President Davis that the club had made great progress socially and also thought it had advanced greatly in a musical direction. The achievements in music had surprised him and he thought the club would compare very favorably with some of the great choral societies. Now he would advise the club to take up some side issue, and suggested a new science called electricity. (Laughter). His experience with electricity had been very recent; he had lately paid a man to remove some lightning rods which were in a wrong place on his house to another position which afterwards proved to be a wrong place also. He remembered reading in an English book on electricity, written by an Irishman, this passage: "The lightning rod was probably the first device used by man to employ electricity for a useful purpose." He had heard some of the members in the back part of the room singing about a certain person called McGinty. Their singing reminded him of the man who was given to singing and was advised to amputate his voice just below the vocal chords. He had asked General Madden about this man McGinty and had been told of the General's recent experience in, or rather out of a boat at the Marine and Field Club. He had told the General that he thought it was a good deal like flying in the face of Providence to get back into a boat out of which he had just fallen. If Providence had not been so kind, perhaps Mr. Lowrey would have had the pleasure of presiding at this dinner.

Mr. Lowrey's witty speech was frequently interrupted by laughter and applause.

The toastmaster next called upon Mr. A. H. Patterson, who said he had left his speech at home and wanted time to think up another.

General E. S. Greeley, when called, said he felt he must say a few words in relation to the club. It struck him that the club was a grand success socially, and he thought that dinners, such as these, did a great deal to build up the club. He thought all present owed a debt of gratitude to the committee of arrangements. He wanted to lay stress on the possibilities the club had before it and related how in 1886 a few men got together to organize a club to draw the representatives of competitive electrical interests into more harmonious relations. Personally he never permitted business competition to interfere with friendly personal relations. The club, he continued, really grew out of a few men meeting together at lunch, and continuing to do so. In conclusion, the General said he intended to make it a rule to attend the club meetings.

General Madden remarked that he didn't want to give those present too much of a dose of vice-presidents, but he would call on another one, Mr. W. D. Sargent.

Mr. Sargent was pleased to respond. He had been well entertained by a few far-fetched remarks—and all telephone remarks are far-fetched—(cries of "Ring off!" "Hang up!" "Are you through?" "Cross talk!" "Busy now," etc). When the uproar had quieted slightly, Mr. Sargent said he had invited as his guest this evening a gentleman whom he wished was better known to the Electric Club members. He would ask his friend, Dr. R. W. Raymond, secretary of the American Institute of Mining Engineers, to favor those present with a few remarks. Dr. Raymond had kept this engagement at great inconvenience to himself, and Mr. Sargent knew all would be glad to hear from him.

Dr. Raymond said he had slipped away from the banquet of the iron and steel men at Delmonico's where he was expected to speak in a short time. He had done a good deal of hard work in helping to entertain our eminent foreign visitors and had come to the Electric Club for rest. He found he had to work again here by having to make a speech. It reminded him of the countryman who went down the harbor to see the Statue of Liberty. Approaching it from the wrong side, he asked, "What's that?" Some one replied, "The Statue of Liberty," "Well, if that's Liberty give me Death!" As he said before, he had come around here for rest and was anxious, now that he had got here, to go back and pick up his load. (Cries of "Get it here!") In connection with mining, Dr. Raymond continued, electricity had made giant strides. Mr. Spaulding had read an interesting and able paper before the iron and steel men describing the use of electricity in mines, and had not half exhausted the subject. The re-

(Continued on page 81.)

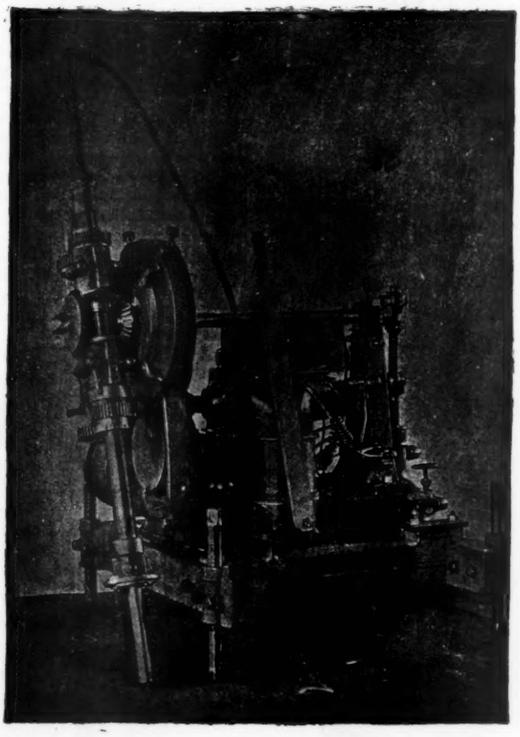


Fig. 1.—New Electric Diamond Drill.—See Mr. Spaulding's Paper, Page 84.

### Slow-Burning Construction.

The Boston Manufacturers Mutual Fire Insurance Company have prepared a monograph on slow-burning construction, the object being in accordance with the policy of this company to provide its clients with information on all subjects tending to the diminution of fire loss, either by later improved fire apparatus or methods of construction. The text and tables are prepared by C. J. H. Woodbury, who is the engineer and one of the officers of the company.

Among the other topics considered in this pamphlet are the strength of mill floors, built by laying heavy planks upon large timber beams, in accordance with the methods which are now in general use throughout the textile factories of New England. Suitable tables give facility for estimating the safe load on floors, or designing floors to meet the proper conditions of the load to be imposed upon. These tables are simple and clear so that the engineering calculations could be made as readily as the computation of interest or discount from a banker's table. But the circular says:

"It is not assumed that these tables will do away with the services of an engineer in general construction, but rather that they may be convenient in many cases where the master mechanic of the works may make plans or supervise changes of construction. The utmost care should be observed to select the figure giving the greatest possible amount and concentration of load as the one which may be put upon any beam or set of floor beams, and in no case should beams be subjected to greater loads than those specified, unless a lower factor of safety is warranted under the advice of a competent engineer."

Other portions of the pamphlet are devoted to giving information upon the proper proportion of timber mill columns which are preferred as offering more resistance to fire than iron pillars, and, as the result of tests by crushing such columns by the testing machine at the United States Arsenal at Watertown, Mass., a preference is expressed for square columns rather than the usual round columns. Extensive tables of the weights of merchandise and machinery, both in gross and on the basis of the space occupied, afford a convenient means of reference in connection with the subject. Fire-proof doors are recommended to be made of two thicknesses of matched boards nailed at right angles with each other and covered with tin, and an illustration represents the details of construction and arrangement of such doors, which can be closed at will like any other door, and also by an arrangement of fusible solder they will close automatically when the heat of the room reaches 162 degrees. An illustration of the perspective of a section of a mill shows the details of preferable methods used in slow-burning construction, which, although designed for textile mills, is doubtless equally applicable to machine shops, and other lines of manufacturing where it is desirable to construct buildings which will be applicable to sustaining heavy machinery under conditions of great strength and safety. Although this pamphlet was designed for the use of those insured by the company issuing it, yet it contains a great deal of information of value to all engaged in manufacturing.

### New Lamp Guard.

Of the numerous forms of lamp guards now in use, many need a shade holder and others have so coarse a mesh as to afford but little protection. Seeing this, Mr. George Cutter has brought out a new form of expanding wire-guard which combines the good features of all the others. It has five rings surrounding the part of the bulb which most needs the protection, has sliding sleeves which adapt it to any 16-candle power lamp, and looks much neater than the older forms. The Great Western Electric Supply Company are pushing this guard.

The Milwaukee Electric Railway Company has brought suit against Conrad Eisenhut to secure $500 damages for alleged interference with the running of cars on the plaintiff's lines. The proceeding was instituted to test the rights of house-movers on streets with electric wires.

### The Universal Arc Lamp.

On this page is illustrated the arc lamp made by the Universal Arc Lamp Company, 49 West 22d street, this city. This lamp is intended for use on direct current circuits having a pressure of from 100 to 125 volts, using from 8 to 9 amperes of current when burning two in series. The resistance is coiled about the top of the lamp within

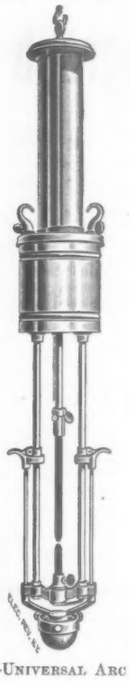


FIG. 1.—UNIVERSAL ARC LAMP.

which the carbon rod is suspended; any additional resistance is unnecessary.

The Universal theatrical arc lamp is made for stage uses and is designed to take the place of the calcium light. It can be used whenever constant direct currents exist, is easily handed, has all the effects of the calcium light, and the cost of operation is said to be much cheaper than the calcium light. The attachment being made at the regular stage pocket, there are no cylinders or hose to encumber the stage. The light, it is claimed, produces no noise and little or no heat. The intensity can be varied from 100 to 10,000 candle power and the lamp is absolutely safe to handle as only 45 volts E. M. F. are used. The choking coils in the resistance box make a short circuit impossible.

The material and workmanship of the equipment are of the best and the mechanism is very simple. The lamp, lens and reflectors, are mounted on a light cast iron cradle under which is a joint that allows the light to be thrown to any point, the lamp burning equally well in any position. An extension stand enables the lamp to be elevated to any required height, while a slip joint allows it to be quickly shifted to any

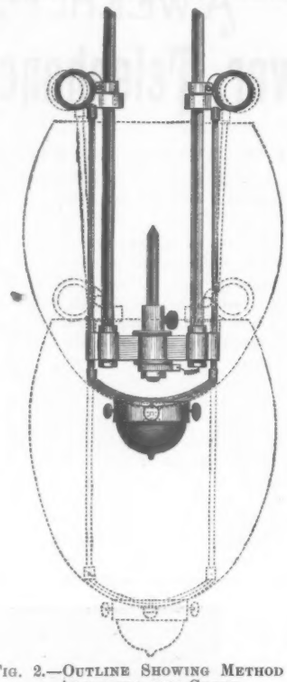


FIG. 2.—OUTLINE SHOWING METHOD OF ADJUSTING THE GLOBE.

stand required. The small cradle is arranged to mount the different reflectors, while in front is attached a sliding color-holder which can be run forward and back to suit the reflector in use. The attaching plug is made V-shape, obviating all liability of making a wrong connection. Besides doing the work of the calcium light, this lamp can be used in producing many novel and striking effects, such as the natural rainbow, illuminated fountain, morning clouds, thunder clouds, chain lightning, and others.

The executive offices of the company are at 16 and 18 Broad street, this city, and the salesrooms are at 49 West 22d street; the officers are as follows: J. H. McClement, president; F. A. Mason, secretary and treasurer; E. S. Mendels, general manager. Directors: J. H. McClement, F. J. Sprague, E. H. Johnson, S. Bergmann, F. A. Mason.

### The Compensation of Alternating-Current Voltmeters.*

BY J. SWINBURNE.

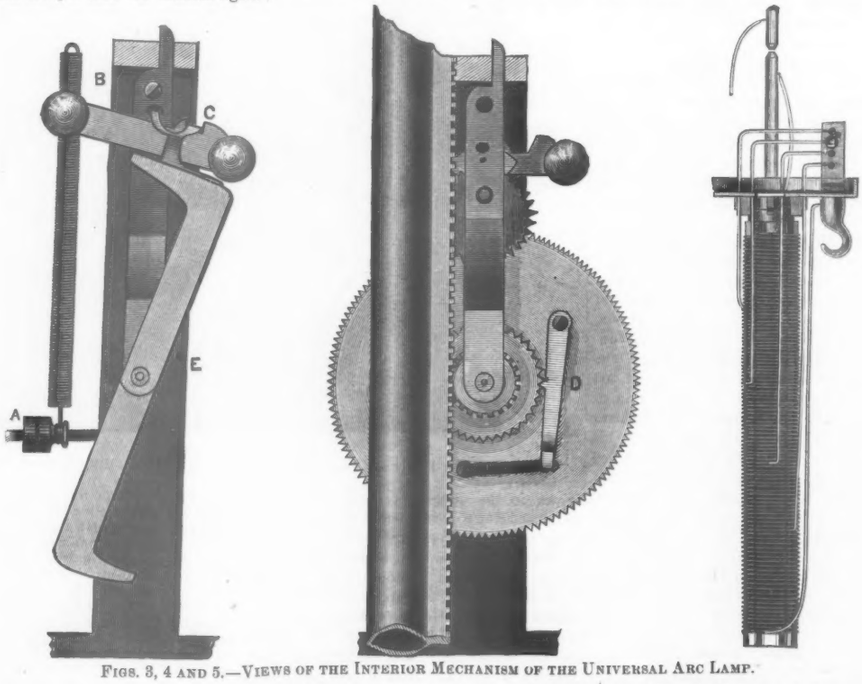
In 1887 I had the honor of bringing before this section several methods of compensating voltmeters and resistance-bridges for variations of temperature. Wires with different temperature co-efficients were used, by which means errors from change of temperature can be avoided. Methods of compensating wattmeters for the errors inherent in them were also explained. The present communication relates to a somewhat analogous arrangement for compensating alternating voltmeters for changes of frequency.

It is much more easy to make a current indicator for alternating than direct currents, for troubles from hysteresis do not come in, and the slight tremble makes the moving part hang freely. If it is attempted, however, to use such an instrument as a volt meter, the self-induction makes the reading far too low, and the error varies with the frequency.

To get over this trouble, a voltmeter may have a non-inductive, or nearly non-inductive, resistance put in series with its active coil. A coil with an adjustable iron core is then put in shunt to the active coil, this shunt coil having a very much larger time-constant. Though both coils have iron cores, they have open magnetic circuits, so they have practically constant co-efficients of self-induction. When the frequency increases, the current through the whole instrument under a given pressure falls; but the back pressure of the shunt coil increases more rapidly than that of the active coil, so that it takes less than its share, while the active coil gets a larger share of the reduced current; the actual current, and therefore the reading, in it remaining constant. The instant is calibrated with a direct current. An alternating current is then put on, and the core of the shunt coil regulated till the readings agree with those of the direct current.

A similar effect might be obtained by putting a condenser in shunt to the non-inductive series resistance; but it does not look so promising, and I have not gone into the size of condenser needed in practice.

*Paper read before the British Association in Section A, Leeds, September, 1890.



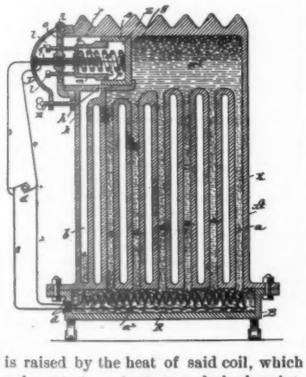

FIGS. 3, 4 AND 5.—VIEWS OF THE INTERIOR MECHANISM OF THE UNIVERSAL ARC LAMP.

Chadbourne, Hazelton & Company, Philadelphia, have received orders from quite a number of electric railway companies for one or more complete equipments, and have closed several contracts for complete equipments throughout that will soon be in operation. They have nearly finished an equipment of five miles of road in Pottsville, Pa., which will operate 10 cars and which will be a most complete installation in every respect.

## SOME RECENT ELECTRICAL PATENTS.

### ELECTRIC HEATER.

In the accompanying engraving is illustrated a recent improvement in electric heaters, patented by Ernest Abshagen, of Chicago. It comprises a metallic radiating frame in which is placed a fluid which will act as a conductor of heat, but which is a non-conductor of electricity. The inventor prefers to use for this purpose whale oil. In the bottom of the radiator, and insulated from the metallic frame, is placed a resistance coil R, which is connected in the circuit of a dynamo electric machine G, or other suitable generator of electricity. Although this resistance coil is in intimate contact with the oil throughout its entire length, it is, of course, carefully insulated from the metallic frame. The heat of the coil when the current passes through it is communicated to the oil, and the latter is raised in temperature. As whale oil boils at 630 degrees Fahrenheit, it will be understood that for purposes of domestic heating no dangers of explosion can occur. Expansion of the oil is provided for, and this expansion is made to subserve a useful function in the operation of the heating system. As shown in the engraving, in the upper portion is arranged, by suitable castings, a box, one side of which, marked E, is adapted to slide under pressure of the expanding oil, when the latter becomes heated, against the tension of a stout spring, and the device is so arranged that when this sliding piece has reached a predetermined limit a contact will be made which will close a short circuit 3, 4, and thus shunt the current from the heat generating resistance R. One of these contacts, as illustrated, is arranged on the inside of the sliding piece E, and the other is adjustable in relation thereto by means of the pivoted arm J, which may be regulated in adjustment by means of the set-screw *u*. By reason of this adjustment device J, the apparatus becomes entirely self-regulating, the point at which the resistance coil is cut out being dependent on the temperature to which the



oil is raised by the heat of said coil, which may be set to act at any desired point. After the oil has been brought up to the proper stage of heat the cut-out acts, the resistance coil is short circuited and remains so until the volume of oil cools down sufficiently to separate the contacts and open the short circuit, when current will again flow through the resistance coil, and the heat of the volume of oil will be raised to the proper degree.

### NOISELESS CAR PROPULSION.

In last week's issue of the ELECTRICAL REVIEW we described a recent improvement made by Mr. Edison in gearing specially adapted for application of electric motors to traction purposes, in which a system of epicyclic gear wheels was used, two of which were loosely mounted on a spindle, and the third was pivotally mounted on an arm rigidly connected to the spindle and remained idle so long as the two loose gears moved at equal rates of speed, but was forced to rotate when any variation of the speed existed. In the accompanying engraving we illustrate a further development of this idea by the same inventor, in which gear wheels are dispensed with and a rope used as a belt is substituted therefor, thus providing for a noiseless transmission of power between the motor shaft and the driven axle. The principle of operation of the device will be understood from an inspection of the detached view Fig. 1, in which C may represent an axle or spindle upon which are loosely mounted two grooved wheels A and B. An arm *a* rigidly secured to the axle C carries four small pulleys, two on either side of the spindle, and a continuous rope G is carried around all of the pulleys. If we assume the wheels A and B to be rotated by any source of power, as for instance an electric motor, in the same direction as indicated by the arrows, then so long as they move at equal rates of speed no rotative tendency will be imparted to the axle C, inasmuch as the wheels turn loosely on the axle and one wheel picks up the rope as fast as the other feeds it; but if there be a difference in speed the arm *a* will be rotated

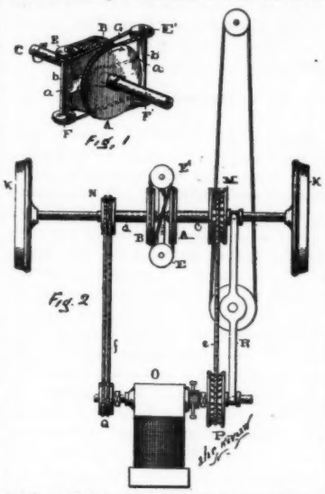


Fig. 1.



Fig. 2

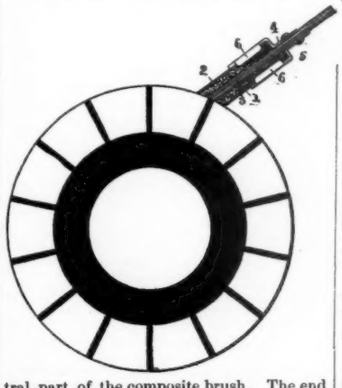
bodily and thus impart a rotary movement to the axle C, the direction of movement depending upon which wheel moves at the faster rate. If B move faster than A, as will be understood from the engraving, shaft C will be rotated in the direction of the arrow at the left; if the wheel A move faster the shaft will be rotated in the opposite direction. In Fig. 2 of the engraving the method of utilizing this system of rope transmission for tractive purposes is illustrated. O represents the electric motor, the spindle of which drives the sleeves *d c* by means of rope belts, and imparts a rotary movement in the same direction to the wheels A B by means of expansion pulleys M P, controlled by means of a lever R, the adjustment of which may be regulated from a front portion of the car through the instrumentality of a sprocket chain, as shown. The relative speed of the wheels or pulleys A B may be varied by adjustment of the expansion pulleys. In this manner the motor may be kept in continuous operation, whereas the car may be stopped, started, driven forward or backward at the will of the motorman.

### METHOD OF ELECTRO-DEPOSITING ALUMINUM.

As the price of aluminum is declining under the improved methods of reduction developed of late years efforts are being made to call into service its many useful qualities. Difficulty has heretofore been experienced in electro-plating metallic articles with aluminium, due to the readiness with which the metal in a state of fine sub-division decomposes water, forming a hydrated oxide in the electrolytic deposit and preventing the formation of a sufficiently heavy layer of metal for practical uses. This oxidation readily occurs at a temperature of 100 degrees F. and increases with the intensity of the depositing current. Mr. J. A. Jeançon, of Newport, Ky., has recently patented a method of electro-depositing aluminium, the distinctive characteristics of which are as an electrolyte a saturated solution of persulphate of aluminium and an anode composed of commercial aluminium having incorporated with it throughout its mass a separating substance such as carbon or kaolin. The anode is prepared by melting the metal in the crucible and stirring in powdered carbon. This sub-division of the metal it is claimed greatly modifies the electrolytic action by a distribution of the current lines over the entire surface of the electrodes. The advantages of the persulphate or acid sulphate of aluminium as an electrolyte are that a high temperature is necessary to interfere with crystallization when this salt is used. A high temperature is important not only in preserving the condition of super-saturation of the solution but also in facilitating the dissolution of the molecules of the salt in the performance of the electrolytic work of the current which is one of low electro-motive force but great quantity. The process is claimed to produce a dense and compact deposit of aluminium which may afterwards be burnished in any way. The excess of acid in the electrolyte not only reduces the resistance of the latter but also prevents oxidation of the metal by facilitating the evolution of hydrogen which passes off freely during the electrolytic action. It also tends to prevent the formation of a hydrated oxide in the deposit, since it converts such immediately into the salt of the electrolyte. Under these conditions the solution is constantly replenished from the anode and a reguline deposit of great density and any desired thickness may be produced.

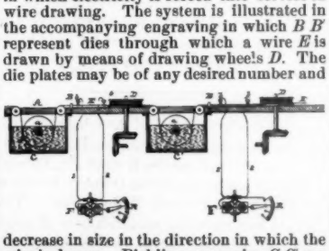
### COMMUTATOR BRUSHES.

An improvement in commutator brushes recently patented by Charles Wirt, of Orange, N. J., is illustrated in the accompanying engraving. The brush is composed of several sections 1, 2, 3, the middle one of which is metallic and the other two are carbon, the three being held together in any suitable form of clamp. Instead of the carbon lead might under certain circumstances be employed, the point being that the two side plates are made of a material having a lower degree of conductivity than the central part of the composite brush. The end which bears upon the commutator is given a curvature to correspond to that of the commutator segments. As the commutator cylinder advances under the brush the latter passes from one segment to another, connection being broken with the first segment and made with the succeeding one gradually, the outer plates of the brush serving as resistances and tending to reduce the amount of sparking.



### ELECTRIC WIRE DRAWING APPARATUS.

Mr. Edison has recently patented a device in which electricity is forced into service in wire drawing. The system is illustrated in the accompanying engraving in which *B B* represent dies through which a wire *E* is drawn by means of drawing wheels *D*. The die plates may be of any desired number and decrease in size in the direction in which the wire is drawn. Pickling reservoirs *C C'* are arranged at suitable intervals to remove the oxide from the wire. Between each die and its co-operating drawing-wheels are two brushes connected in circuit with a source of electrical energy, these brushes bearing on the wire. A current of sufficient volume is passed through the brushes and the interposed section or wire to bring the latter to a temperature at which it can be readily worked. The strength of current and consequently the softening power thereof on the wire may be regulated by means of variable resistances interposed in the heating circuit.



**Owosso, Mich.**—Owosso City Electric Railway; capital, $50,000.

**Detroit, Mich.**—Detroit Dynamo Company; capital, $25,000.

**Chicago, Ill.**—Archer Electric Light Company; capital, $15,000.

**Chicago, Ill.**—Electrical Reminder Company; capital, $25,000.

**Chicago, Ill.**—Chicago Illuminating Company; capital, $500,000.

**San Francisco, Cal.**—Christy Telephone Company; capital, $1,000,000.

**Howell, Mich.**—Howell Electric Light & Power Company; capital, $10,000.

**Centreville, Ia.**—Centreville Light, Heat & Power Company; capital, $35,000.

**Chicago, Ill.** — Underground Electric Lighting Company; capital, $1,000,000.

**Seattle, Wash.**—The Rainier Avenue Electric Railway Company; capital, $250,000

**Mount Pleasant, Mich.**—Edison Electric Light & Power Company; capital, $10,000.

**Detroit, Mich.**—Ann Arbor, Ypsilanti & Detroit Street Railway Company; capital, $100,000.

**Leavenworth, Kan.**—Leavenworth Electric Street Railway Company; capital, $500,000.

**Waukegan, Ill.**—Norton Electric Boot Blacking & Novelty Manufacturing Company; capital, $1,000.

**Austin, Tex.**—Terrel Electric Light Company; capital, $10,000. Incorporators, T. F. Bowles, J. M. Powers and John L. Terrel.

**Derry, Pa.**—Derry Electric Light Company, with a capital of $5,000. Directors—George F. Huff, Greensburg; A. O. Caven, Derry; Edward Pitcairn, Wilkinsburg.

**Waxahachie, Pa.**—The electric lighting company has increased its capital stock from $10,000 to $18,000, and will order all necessary machinery to enlarge its plant.

**Jersey City, N. J.**—The Crescent Construction Company, capital $100,000. Incorporators, C. F. Cutler, D. B. Parker, W. T. Bouchelle, Joseph Kavanagh, U. N. Bethell.

**St. Louis, Mo.**—Hazeltine Electric Company; capital, $650,000; incorporators, C. N. Hazeltine, G. W. Parker, D. R. Russel, T. G. Portis, J. C. Atwood and Le Grand Atwood.

**St. Louis, Mo.**—The Southern Electrical Supply Company has filed its application for an increase in capital stock from $10,000 to $25,000; its assets are $33,837.68, and liabilities, $6,532.93.

**River Forest, Ill.**—River Forest Water, Gas and Electric Light Company; to furnish water, gas and electric light; capital stock, $75,000; incorporators, H. E. Broughton, Frank C. Smith, H. Stemble.

**Cherokee, Ia.**—The Cherokee Electric Light & Power Company, with a capital stock of $25,000; president, J. C. Hall; vice-president, W. A. Sanford; treasurer, Chas. E. Moore; manager and secretary, J. C. Hutchinson.

**St. Louis, Mo.**—The St. Louis Unicycle Railroad Company; to operate an elevated electric railway having but one rail; capital; $200,000. The officers are: President, L. A. Brown; vice-presidents, John H. French and J. W. Tremayne; treasurer, W. A. Adams; secretary, Chas. H. Wengler. directors, Chas. H. Gleason, Chas. H. Blake and David Strawbridge.

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It is stated that primary batteries are no longer used for telegraphic service at the Central Telegraph Office in Berlin; storage batteries charged by the dynamo electric machines of a lighting station being substituted as a supply of operating current.

What is the best name for the man "who didn't know it was loaded"; the servant girl who starts the fire with kerosene; the man who smokes cigarettes over a can of powder; the lineman who handles a live wire without rubber gloves; and the station employé who puts one hand on an arc current switch and the other on an iron steam pipe?

Government control of the telegraph, telephone, express business, railroads and nearly every municipal service is what Mr. Edward Bellamy advocates in the October *Forum* as "First Steps Toward Nationalism." This would lead up to the establishment of a system of national stores where everybody could be furnished everything at cost. The New York *Sun* concludes an editorial on the subject thus: "If it were not for the trifling circumstance that his beautiful scheme leaves out of the reckoning individual human nature and Julius Cæsar and Jay Gould and Tom Reed and Napoleon Bonaparte and a few other fellows, not to mention the original Adam, the whole business of nationalization would be as simple as one of the contrivances where you press the button and somebody does the rest."

Col. Anthony D. Bullock, of Cincinnati, president of the City and Suburban Telegraph Association, and of the Bell Telephone Exchange, a prominent and wealthy capitalist and a highly esteemed citizen, died of apoplexy at his home in Mount Auburn, Friday evening of last week. He has two sons, one in Williamstown, Mass., and one in Cincinnati. No man in Cincinnati was better known or more highly esteemed.

The banquet given at the Electric Club on the evening of October 2d was an affair of which many older metropolitan clubs might well be proud. The arrangements were perfect down to the minutest details, and the dinner passed off with an *eclat* and brilliancy which must have been most satisfactory to its projectors. The Fall and Winter season is now opened, and it is hinted that the Entertainment Committee has several pleasant surprises in store for future meetings of the Club.

The Ferranti alternating current mains forming part of a system by which London is to be supplied with current at 10,000 volts are now partly laid. The conductors consist of two concentric lengths of thick copper tube, separated by waxed paper and covered with an enclosing steel tube separated by insulation. It is made in 20 feet lengths, adjacent sections being connected by a conical joint, one being bored and the other tapered and pressed together while heated. The conductors are laid in troughs of creosoted boards, and covered with bitumen, a layer of asphalt being laid over the top board. A curious incident of alternating current with great lengths of conductors is said to result in using these high pressures. A transformation which would give 20,000 volts in a short length of main if applied to a length of some miles may give a pressure of 25,000 or 30,000 volts; or, as put by the London *Electrical Engineer:* "When running some score or two of lamps, the potential which at the generating end would be normal (say 2,500 volts transformed up to 10,000) has shown up to 160 volts on the lamp circuit when transformed down again, instead of 100 volts, thus indicating the pressure in the charged length of main to be raised to 160x24x4=15,360 volts instead of the original 10,000 volts."

### *KILL YOUR HOGS BY ELECTRICITY.*

Although electrocution is a dismal failure as a mode of inflicting the death penalty on criminals, it is claimed to have great commercial advantages when applied to hogs. It is claimed that the passage of the current not only kills the hogs, but kills trichinae at the same time. Whether this claim has any foundation in fact, we cannot, at the time of writing say; but it seems plausible. If substantiated, the discoverer should be canonized as a great benefactor of the human race, and deserves of Congress a gold medal for a clear-cut solution of the international question raised by the American hog. Perhaps the Patent Office might be willing to give him the privilege of reserving all rights for this method of *curing* ham.

### *RESISTANCE OF THE HUMAN BODY.*

Professor Swinburne has tested the resistance of a number of different individuals, the current being passed from hand to hand. The result of his tests indicates that the effective resistance is less to the flow of the alternating than the direct current in the same individual, and that the resistance offered to either current varies widely with different persons. Out of five subjects tested the resistance to a continuous current of 50 volts was found to vary from 3,320 to 10,000. An incident very pointedly developed by the tests was the great difference in strength of current that can be endured by different people. The subject having the highest resistance was a lady.

### *ELECTROLYTIC PRODUCTION OF PURE IRON.*

A process for the direct conversion of pig iron into wrought or ductile iron, without decarbonization by heat, has been invented and worked out to a practical shape by Dr. Stephen H. Emmens, of Emmens, Pa., the inventor of the powerful explosive which bears his name and is now most successfully going through the ordeal of government tests. Wrought iron, so-called, is to-day almost universally produced by the process of puddling cast or pig iron, the higher and costlier grades of pig being used, especially in the production of the finer brands, known as "Norway" and "Swedish" iron. The puddling process may be said to be simply the burning out of the contained carbon by the agency of heat and oxygen, and successful puddling requires great skill and extremely hard labor, which must be paid for accordingly. The Emmens process, as to the actual conversion, requires no heat and no skilled labor, but for merchantable bar or sheet iron, the product is simply heated and rolled or hammered. The process is hardly to be described as decarbonization of pig iron. To coin a word for the purpose, "deferication" of pig metal would more accurately describe what takes place. The process is electrical, and the pure iron is extracted from the crudest and most impure pig iron or pot metal with as much facility as from the best charcoal pig.

Many attempts have been made to force iron into the list of electrolyzable metals, but failure has marked all efforts except in the electroplating of engravings or copper electrotypes with a coating of hard iron. The difficulty has been completely overcome by Dr. Emmens, whose electrolyte and current treatment are such as to form a perfectly reguline and closely adherent cathode of iron of almost chemical purity, which then only needs washing, heating and rolling to produce an article equal to the finest Swedish iron, being very soft and easily worked. The inventor claims to be able to make the iron from pig and put into merchantable shape at a less cost than the ordinary puddling process, and at the same time to further cheapen the cost by using the very lowest priced grades of pig iron. If this be true, and there seems to be no reason why it is not, the effect can hardly be safely predicted. Electricity as a commodity is now a very cheap article, and its production is as certain and uniform as the laws of science can make it. It is said that the residue of the anode, composed of graphite, silicon, sulphur, phosphorus, etc., from which the iron is, of course, absolutely freed, makes a valuable basis for mineral paint, and probably this is the case.

The metallurgist will at once realize the value of this process, if for no other reason than that it at once makes available for the production of iron, immense deposits of iron ore in various parts of the country, which are now useless owing to the prohibitive quantities of phosphorus and sulphur they contain. Such ores are not available even for the Bessemer or open hearth process, which produce low steels containing a very small proportion of carbon. But for the Emmens process these ores are practically as good as any. They can be smelted, run into slabs of proper size and shape and the only effect of the impurities is upon the character of the anode residue. The cathode will in all cases be practically and almost chemically pure iron. Not only that, but when heated and roll or hammered its quality is of the very highest grade. If, as seems to be fairly within the truth, such iron can be produced from such pig at a cost below or even the same cost as an equal quality by the puddling and refining furnaces, the result must be necessarily important in the future development of the iron industry.

The process is of interest also to the electrical fraternity in point of utility. The forged product is said to be surpassing in its fitness for magnet cores for all purposes on account of its great purity and the low resistance of a magnetic circuit composed of it. This would seem to be true by comparison. The most impure cast iron has the least magnetic permeability, and the co-efficient of the latter rises as the cast iron approaches the character of wrought iron. Swedish iron is the purest commercial iron we are acquainted with, and we all know its splendid magnet-making properties when energized. The Emmens iron, being still purer, ought to make a proportionately better electro-magnet. If it does, the electrical industries alone will create a heavy demand for the new product.

# CORRESPONDENCE.

## News from Boston and Washington.

### OUR BOSTON LETTER.

**The New England Portelectric Company** gave another successful exhibit of the working of its system at Harvard Station, Dorchester, Mass., Saturday, October 4.

**Mr. E. P. Bullard,** proprietor of the Bridgeport, Conn., Machine Tool Works, is installing an isolated incandescent Edison plant at his factory. The Evans system will be used to connect the 360 light machine direct with engine.

**The Electrical Exhibit** at the Mechanics' Fair, this city, is hardly yet in shape to justify descriptive notice. In another week, however, a large variety of electrical machinery will be in position.

**Mr. W. H. Ordway** has resigned the position he has long and creditably held with the Isolated Department of the Thomson-Houston Electric Company, and will enter the employ of the Bowker Fertilizer Company, Savannah, Ga.

**Eastern Electrical Supply and Construction Company** has started in energetically to get its share of the New England Electrical trade. Its extensive and neatly stocked salesrooms are at No. 65 Oliver Street.

**Change in Name.**—The fire alarm system known as that of the Martin-Wilson Automatic Fire Alarm Company, was sold September 30, to the United States Electric Fire Signal Company, Boston.

**The Erie Telephone Company** reports that its net earnings for July and August, 1890, show an increase of $10,600 over same period last year, 94 subscribers were added during the period first named, making a total of 17,756 connected October 1.

**Messrs. Drake, Payson & Whittier** is the style of the new electrical firm recently established in Providence, R. I. The three gentlemen comprising this firm are "old hands" at the electrical business, and they comprehend the requirements necessary to ensure a successful future for their new enterprise. They will handle supplies for electric lighting, electric railways, and electric power of all manner and kind; also new and second electric light and power machinery and will make a specialty of installation of isolated plants.

**No damages.**—At the meeting of the Board of Aldermen, of this city, Thursday evening, October 2, a special session was held for the purpose of making an appraisal of the alleged damage caused by the erection of telegraph poles on certain streets, and the board decided there was no ground for claiming damages.

**The Technology Electric Club,** composed of electrical students at the Massachusetts Institute of Technology, held a meeting on Saturday, October 4. The following officers were elected: President, F. T. Snyder, '91; vice-president, H. H. Waitt, '91; secretary, A. N. Mansfield, '91; treasurer, G. H. K. Oxford, '91; executive committee, the secretary, treasurer and J. N. Wendell. Monthly meetings will be held and papers presented on electrical subjects.

**Isolated Electric Lighting.**—As very strong evidence that the manufacturing interests, both large and small, in New England are manifesting a preference for electric lights to either gas or oil, have simply to invite attention to the orders received last week by Manager James R. Magee and his staff of the Isolated Department, Thomson-Houston Electric Company, *i. e.*, 23 plants, aggregating 4,000 incandescents and 100 arc lights. W. I. B.

Boston, October 4th.

### OUR WASHINGTON LETTER.

**The Business** of the Washington bureau of the Thomson-Houston Company has grown to such proportions under the management of Capt. F. H. Clark, that two assistants have been assigned to him. Mr. E. G. Waters, an experienced mechanical engineer, attends to matters connected with the lighting and railroad business, while Mr. R. C. Wiggins represents the Thomson-Houston Motor Company, and has charge of everything pertaining to stationary motors.

**Recent Edison Contracts,** made by Mr. Silsby, of the Washington office, include one with the Judson Pneumatic Railway Company for lighting its Washington tower station, and another for lighting the building of the *Norfolk Virginian*. Mr. Silsby has also closed a contract for an increase of the public station plant at Bedford City, Va.

**Sales of "C. & C." Motors** in Washington by the Washington Construction Company, include the following: To Norris Peters, one seven horse-power motor for driving the presses on which the illustrations for the Patent Office *Gazette* are printed; Geological Survey, one four horse-power motor operating a printing press; and the Lincoln Hotel, one five horse-power motor to run an elevator for seven stories. G. C. M.

Washington, D. C., Oct. 4, 1890.

## A GREAT CLUB DINNER.

(*Continued from page 77.*)

lation of the adaptation of electricity to mining brought to his mind the story of a man who owned some game chickens and his neighbor who had some Shanghai chickens. A game hen went over into the Shanghai man's yard and laid an egg which a Shanghai hen hatched out. Then a dispute arose as to which man owned the game chicken hatched by the Shanghai hen. Dr. Raymond completed the analogy by asking what good an egg was until it was hatched, anyway. He finished his bright and interesting speech by reading a poem written for the Iron and Steel Reception entitled "Uncle Sam's Welcome." It had literary merit of a high order, besides being extremely funny.

General Madden announced that the long distance telephone would make the next response. "The Star Spangled Banner," was rendered and an encore demanded. Mr. A. S. Hibbard, of the telephone company, responded with a song, "The Sunday School," which was greatly applauded.

Mr. Franck Z. Maguire then followed with some verses, called "A Dream," which contained a number of good hits on leading members of the club.

Mr. Frank Treat Southwick then gave some selections on the piano.

General Madden announced that Mr. A. H. Patterson's time had now come, and called upon him to exert himself.

Mr. Patterson did so, by saying he hoped his time had not come, and followed with some bright remarks.

A song by the Aurora Grato Quintet was next given.

Ex-President E. T. Gilliland was called out, and expressed his satisfaction at the growth and progress of the club in brief but well chosen words.

General Madden then said he had the honor of introducing one of the visiting Englishmen mentioned by Dr. Raymond, Mr. Charles McLaren, an ex-member of Parliament and a nephew of John Bright, one of America's best friends.

Mr. McLaren was greeted with great applause and cheers. He said he had always heard that Americans were the most brilliant of after-dinner speakers—now he was assured of the fact. It was his first experience in America at after-dinner speaking, but he could say he never felt more dazzled, not only by the brilliancy of the electric lights, but by the brilliant scintillations of intellect. He felt as if he were in the midst of a coruscation of electric sparks. "America is a great country," continued Mr. McLaren, "but her people are still greater. You and I represent two branches of one great race. (Loud applause.) The time has gone by for any but a friendly feeling between these two great peoples."

He concluded by passing compliments upon the club and the great advances Americans had made in all branches of science, especially in electricity. Mr. McLaren's speech was vociferously applauded, and when Mr. Patterson proposed "three cheers for the Union Jack and the Stars and Stripes," they were given with a will, and a tiger that endangered the roof.

Quiet being approximately restored, Mr. Charles Dutton, of the Southern Bell Telephone Company, was called upon. He prefaced his remarks by stating that on occasions when Electric Club dinners were to be discussed, he was nineteen to the dozen. He gave some interesting and humorous incidents of the early life of the club, and called for a health to be drunk to Col. Geo. L. Beetle, a charter member, who was not present on this occasion. Mr. Dutton closed his remarks urging the club in its progressive work, by reminding the club of Edmund Burke's exhortation to his constituency in a speech at Bristol: "Applaud us when we run, console us when we fall, cheer us when we recover, but for God's sake let us pass on—let us pass on!"

After another song by the quintet, the toastmaster called upon Dr. Otto A. Moses, who delivered some eloquent and forcible remarks, reminding young electricians that every light had its shadow, and urging them to keep in the van of progress, and to consider that on them the future of electricity must depend.

Another musical selection by the quintet followed, when Mr. A. H. Patterson assumed the duties of toastmaster. He called upon Captain E. L. Zalinski, U. S. A., and Lieutenant Veeder, U. S. N., as representatives of both branches of the national service. They replied fittingly but briefly.

After another song, Mr. Patterson called upon another speaker, and at the same time safely delivered himself of this epic:

There's a knowing old bird in this town of York,
A sort of a Poo-Bah—his name it is Storke.

As Mr. Storke did not seem to be present or accounted for, Mr. H. B. Thayer happily responded in his stead. After reading several messages of regret, Mr. Patterson announced that whomsoever the spirit moved was at liberty to speak or sing. The opportunity was taken advantage of by several gentlemen, and the formal ceremonies were over. Many remained until a much later hour, all congratulating themselves on being present.

AFTER DINNERETTES.

U. S. Senator Plumb had been invited and expected to be present; but Congress adjourning so late Wednesday he was unable to get to New York in time and sent a telegram of regret, expressing his interest in the progressive Electric Club.

Dr. Leonard Waldo telegraphed: "Club dinner to-night impossible. Sorry. But I never will be missed." But he was.

Col. J. J. Dickey, of Omaha, Thos. B. Doolittle, of Bridgeport, and many others sent letters of regret and well wishes for the club.

It is needless to say that the injunctions in the following letter, dated San Francisco, Sept. 11, from the club's most distant member, were complied with: "I won't be at the Electric Club until about the middle of October. But put me on the list for two tickets. If I'm not there don't allow any one to sit in my two seats, and see that my two glasses are kept filled. JOHN I. SABIN."

Vice-President Patterson, who has been absent from the city all Summer, and who has returned with health fully restored, was warmly welcomed by a host of friends, and assisted with his usual good spirits in making the occasion socially enjoyable. As the Italian baritone singer he is without a peer.

This dinner proved that eloquence and electricity go together.

The novelty of the concealed telephone music struck the daily press of the city as an interesting feature, and the papers the next morning mentioned it at length.

A party of the old telephonists got together after the greater number had left, and with Hibbard and his banjo and Maguire at the piano and Conductor Patterson wielding the baton, sang all the old songs in an enthusiastic, not to say artistic, manner.

Ex-Mayor Abram S. Hewitt wrote the following letter to the secretary:

MY DEAR SIR: On my return from Europe, I find your letter of the 2d inst., in which you kindly suggest that I shall attend the dinner of the club to be held on the 2d of October next. It would give me very great pleasure to be one of the number who are to share in the enjoyment of the occasion, but unfortunately the condition of my health makes it necessary for me to decline all such temptations to violate the injunctions of my doctor. I thank you very much, however, for the kind manner in which you have communicated the invitation, and beg to assure you that I remember the only occasion when I was present at the club with very great satisfaction.

Sincerely yours, ABRAM S. HEWITT.

A lecture of a scientific nature will be delivered at the club the last Thursday in October, and a "smokers' sociable" is proposed a week or two later.

A. S. Hibbard, of the Long Distance Telephone Company, is to be credited with the idea of the concealed telephone band, and he and Electrician Pickernell successfully carried it out. It was quite a surprise to all, except a few in the secret, and was the hit of the evening, even among electrical men, who are not easily surprised, and was another convincing proof of the wonderful flexibility of the telephone.

It was President Madden's idea to have this opening dinner, and he was very happy over its success. His duties as presiding officer, with such a jolly party of electrical men to manage, were performed in a pleasant and dignified manner, and a long programme was so varied and made so informal as to be unusually enjoyable, and when all was over more was still wanted.

The ices were served in shapes of many electrical appliances, such as incandescent lamps, telephones, etc. The ice shell, in the shape of an incandescent lamp, that covered the punch, was so solid that several members mistook it for glass.

Mr. Maguire's dream, which was in rhyme was much appreciated. It spoke of the Electric Club and its magnificence one hundred years hence, although, even then, electricity was said to be "in its infancy," and the author thought that Gabriel's trumpet would still find it so. A number of humorous allusions to various members of the club met with generous applause.

THE ATTENDANCE.

There was scarcely a vacant seat, and the committee of arrangements is to be congratulated on seating so many so comfortably on the one floor. A diagram of the table, with the name of each person in proper place, had been prepared, and all were easily and quietly seated. There were present the following named gentlemen, and a finer looking set of men never were seen in evening dress:

President O. E. Madden, ex-presidents E. T. Gilliland and H. C. Davis, vice-presidents Grosvenor P. Lowrey, W. D. Sargent and A. H. Patterson; Chas. McLaren, ex-member of Parliament, was present as the guest of Mr. Davis; Lieutenant Veeder, U. S. N., as the guest of Mr. Patterson; Dr. R. W. Raymond and Mr. Alex. Cameron, guests of Mr. Sargent; Mr. Chester S. Lord, managing editor of the New York *Sun*, as the guest of Mr. Price; Baron Blanc, as the guest of Mr. Fleming; Judge Taylor, of Fort Wayne, Ind., as the guest of H. C. Adams; Dr. W. C. Bitting, of Baltimore, as the guest of Mr. Beidler; Mr. J. W. Welch, as the guest of Mr. Alexander; Mr. Frank Treat Southwick, as the guest of Mr. Bartlett; Chas. F. Peck, New Haven, guest of Mr. E. F. Peck; and A. P. Meaney, G. T. Manson, T. C. Martin, O. A. Moses, F. C. Mason, G. B. Prescott, Jr., G. M. Phelps, E. F. Peck, A. H. Patterson, Lieutenant F. J. Patten, U. S. A., H. A. Reed, H. A. Stout, W. D. Sargent, C. E. Stump, H. D. Stanley, A. L. Salt, C. W. Price, H. L. Shippy, C. D. Shain, J. W. Stover, H. L. Storke, H. B. Thayer, T. Vonder Luhe, G. Worthington, J. Wetzler, A. T. Welles, J. A. Wetmore, J. C. Reilley, H. McCully, F. J. Hovey, Captain E. L. Zalinski, U. S. A., F. R. Colvin, Chas. F. Peck, A. Cameron, Dr. Bell, N. M. Beach, Mr. McCartney, Mr. Taintor, Louis H. Orr, H. C. Spalding, E. S. Innett, H. C. Adams, P. H. Alexander, P. C. Ackerman, C. O. Baker, Jr., W. R. Brixey, E. E. Bartlett, W. T. Beidler, C. H. Barney, T. P. Conant, J. C. Chamberlain, G. B. Coggeshall, W. L. Candee, R. Crawford, J. J. Carty, S. L. Coles, C. Dutton, A. J. De Camp, H. C. Davis, W. H. Fleming, A. R. Foote, A. V. Garratt, General E. S. Greeley, E. F. Gennert, E. T. Gilliland, A. S. Hibbard, C. N. Judson, Dr. J. B. de Lery, Francis P. Lowrey, F. Z. Maguire, W. J. Morrison, A. F. Moore, A. G. DeWolfe, W. C. Peet, F. A. Pickernell, Mr. Cole, John H. Meeker, T. R. Taltavall, Wm. F. Cullen, Mr. Marsh, S. H. Pine, H. H. McLean, Davis Pearson, C. A. Hamilton.

## The New Tariff.

Here are some of the changes in the tariff which will interest readers of the ELECTRICAL REVIEW:

Aluminium, formerly free, increased to 15 per cent. ad valorem.

Brass bars or pigs, old, yellow metal fit only for re-manufacture, no change.

Copper, ores, reduced from 2½ cents to 1½ cents.

Old copper for remanufacture reduced from 3 cents to 1 cent a pound,

Copper in plates, bars or ingots, not manufactured, from 4 cents to 1¼ cents.

Copper in rolled plates, rods, pipes-sheathing, remain sat 35 per cent. ad valorem.

Lead remains unchanged.

Nickel, nickel oxide alloy reduced from 15 cents a pound.

Tin remains at 4 cents a pound.

Zinc in blocks or pigs is increased from 1½ cents to 1¾ cents a pound.

Old zinc, for re-manufacture, from 1½ to 1¾.

Blue vitrol or sulphate of copper reduced from 3 cents to 2 cents.

Sal-ammoniac changed from 10 per cent. ad valorem to ¾ cents specific.

Sal-soda and soda ash remain at ¼ cent.

Caustic soda reduced from 1½ cents to 1 cent.

Sulphuric acid from free to ¼ cent a pound.

Wire and wire rods it is reduced ¼ cent a pound, where they are not covered. Where they are covered with cotton, silk, or the like, it is increased 1 cent a pound. Flat steel wire increased from 45 to 50 per cent. ad valorem.

## A. B. C.'s Open House.

Alexander, Barney & Chapin held an all day reception in their new and elegant quarters, 20 Cortlandt street, on Monday, October 6th. Crowds thronged the spacious salesrooms, and all the friends of the three gentlemen had a kind word to say and hopes for future success. The following elaborate and intensely electrical menu was served:

"Sir, you are very welcome to our house."—*Merchant of Venice.*

MENU.

OYSTERS.—Neutral Points.
SOUPS.—Crowfoot Zinc, Carbon, Blue Vitriol.
FISH.—Pikes, Poles, Nippers.
ALEXITE.—Best Vintage.
ENTREES.—Monkey-Wrench, Pony Magnetos, Turtle Gong.
ROASTS.—Joints, Insulated, Spring Jack, Buzzer.
EXTRA DRY BATTERY.
DESSERT.—Automatic Drops, Cones, Maple Balls.
COFFEE.—Porous Cups (no grounds).
CIGARS.—Electric Club.

The lunch itself proved to be a delicious one, provided by the steward of the Electric Club, and the hungry and thirsty were all made happy.

## Telephonic News

*** The telephone service of Omaha, Neb., is to be improved by putting the wires underground, and building a new exchange.

*** Philadelphia people continue to wonder at the long distance telephone. When a Philadelphian talks over the wires to Buffalo or Washington, he gets himself into the Philadelphia newspapers.

*** In the United States Circuit Court on September 30th, Judge Colt gave the Government until January 1, 1891, in which to take testimony in the Bell telephone case. The Government is now taking testimony in Pennsylvania.

*** Mr. Charles T. Westcott, of Chestertown, Md., has purchased for the Kent County, Maryland, Telephone Company the telephone lines in Queen Anne's county, and will put them in complete working order at once.

*** Mr. Charles J. Glidden, secretary of the Northwestern Telephone Exchange Company, is authority for the statement that Minneapolis will soon have more telephone wires under ground than any other city of its size in the country. It will cost $100,000 to do the job.

*** Manager Stewart of the St. Joseph, Mo., telephone exchange has resigned, to take effect October 1, and will be succeeded by J. O. Stockwell, late manager of the exchange at Hutchinson, Kas. Mr. Stewart resigns to accept a position with the St. Joseph Electric Supply Company.

*** Suit has been brought in Philadelphia against the Bell Telephone Company by the Brown Electric Protector Company, and damages to the extent of $100,000 are asked because the Bell Company recently issued a circular to its subscribers warning them against using the Brown protector, on the ground that it is a "fruitful cause of annoyance and interruption.

*** The Northwestern Telephone Exchange Company (Erie company) has elected the following officers: President, Levi Sprague; secretary and treasurer, Charles J. Glidden; directors, Levi Sprague, Charles J. Glidden, A. S. Adams, C. E. Adams, W. A. Gove, J. E. Hudson, Francis Jewett, J. W. C. Pickering, A. C. Russell, Thomas Sherwin, James A. Weston and H. A. Whiting.

### A Good Word for the Boy.

A report of a collision on a railroad in Ohio, a few days ago, in which eight persons were killed, states that it resulted from the failure of the telegraph operator to deliver a train order, and adds: "The operator was a mere boy." While it is impossible to excuse such a mistake, it is well to view the matter dispassionately, and avoid putting too much bitterness into unavoidable censure. And first of all, it should not be forgotten that some responsible person, or corporation, put "the mere boy" in his very trying position. Many of the railroad operators not only do a vast amount of important telegraphing, but, in addition to that work, they operate train signals, turn switches, sell railroad tickets, keep freight accounts, check baggage, act as express agents, frequently load and unload freight, and perform many incidental duties in connection with their company's affairs. Over twelve thousand railroad stations swing the familiar trade mark signs of the Western Union Company, and the operators are required to do the commercial business for little or no pay. Their hours of labor are long; their wages are small. They are generally persons of intelligence and integrity. They bear responsibilities of the most momentous importance. They commit few errors and fewer frauds. No occupation in life is free from blunders. Don't be too hard on the boy.

### The Ball and Norton "Monarch" Magnetic Separator.

BY C. M. BALL, TROY, N. Y., BEFORE AMERICAN INSTITUTE OF MINING ENGINEERS, NEW YORK, SEPT. 30, 1890.

The magnetic concentration of iron-ores has been so often and so widely studied and discussed among the members of the Institute that any remarks concerning its general importance, from an economic standpoint, would be superfluous; but it is thought that a description of the Ball and Norton ore-separator, designed for cobbing and separating magnetic iron-ores, indicating its essential differences from other machines and the advantages claimed for it, together with some account of recent results obtained in its application to the concentration of such ores, will prove of interest.

This machine is the joint invention of Mr. Sheldon Norton, of Hokendauqua, Penn., and the writer, and has been patended in the United States, Canada, and other countries.

In the accompanying illustrations, Fig. 1 represents a longitudinal vertical section of the perfected Monarch ore-separator, adapted for separating fine ore, and Fig. 2 the same, adapted for cobbing ore of the size of stove, or chestnut-coal. The two designs are identical in principal, and vary from each other in minor details only.

The apparatus consists of a partially-closed chest, having an opening at *f*, from the feed-hopper *h*, through which the ore is delivered to the machine from an ore-pocket or storage-bin provided with means for regulating the flow of ore, so that, when the machine is in operation, the hopper is kept always full. Other openings are provided for the discharge, at *t*, of tailings; at *m*, of middlings; and at *c*, of concentrates; also at *e*, for allowing free ingress of air to the chest at that point, and at *s*, where a powerful exhaust-fan is connected. The openings at *t* and *m* are kept sealed against ingress of air at those points by means of the hinged and weighted valves, *v*, *v*, which discharge the products from the hoppers *p* and *k* continuously, and in the same proportion as received from above, when a sufficient weight has accumulated upon the inside to cause the contents of the hoppers to leak by the valves.

The machine is also provided, as shown, with two drums, Nos. 1 and 2, turning upon the shafts, *i* and *j*. These shafts, together with the magnets *a* and *b*, which they also serve to support, stand still while the drums may be rapidly revolved around the magnets and out of contact therewith.

It will be noticed that the magnet occupies a section of the drum, the proportions being such that, approximately, one third of the periphery of the drum is within the influence of the magnetic field, while the upper two-thirds is outside of the field and removed from the magnetic influence. The magnet is so constructed as to present a series of poles of alternately opposite polarity near the inner surface of the drum. In accordance with the well-known phenomena of magnetic attraction, which in the case of powerful magnets is exerted at a considerable distance from the magnetic poles, any magnetizable matter brought near the outer surface of the drum, within the arc covered by the magnet, will be powerfully attracted and drawn into firm contact with the outer surface of the drum.

These drums are composed of a non-metallic and neutral material, such as wood, paper, etc., and they turn in the direction indicated by the arrows near the top of the drums.

Just below the feed-hopper an apron of neutral metal, No. 3, is arranged, curving downward and forward in the direction of the rotation of the drum, its lower portion describing a short arc concentric to the surface of the drum. This serves as a chute to direct the stream of ore falling from the feed-hopper within the influence of the first two or three poles of the magnet. A similar but somewhat shorter apron, No. 4, is arranged in like relation to the second drum, and magnet *b*.

Attention is called to the provisions for applying and directing the air-current, which fulfils an important function in the process of separating ore as developed in this apparatus. The air may enter freely at the openings *c* and *e*, and is drawn through and out of the chest by the action of a powerful exhaust-fan connected at *s*. The air which passes through the chest containing the drums and magnets must, of necessity, follow the course indicated by the arrows in the space below the drums.

When the machine is put in operation the magnets are excited, the drums are revolved in the direction before indicated, the air-current is established through the machine in a direction opposite to that of the rotation of the drums, and ore is supplied through the feed-hopper which is kept always full. The ore passes down the chute under the first drum, and, as soon as it comes within the influence of the magnet, the magnetizable portions are drawn into contact with the drum and, through friction upon its surface, take on the forward movement of the drum. At this stage, a curious and important result takes place. In accordance with the well-known laws of magnetic induction, a particle of iron brought near a magnet itself becomes a magnet by induction, and the magnetic force tends to bring the longer axis of this induced magnet into a position as nearly as possible parallel to

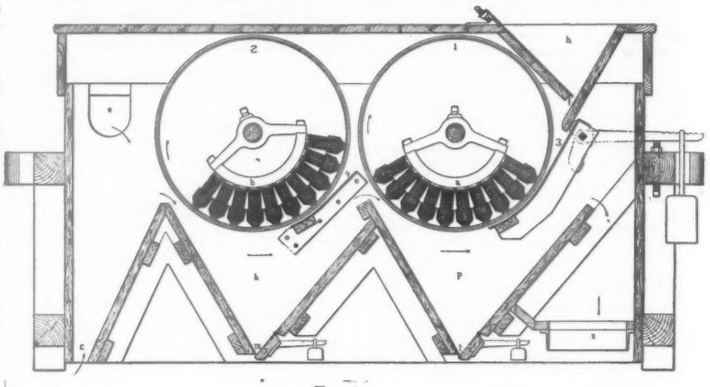


FIG. 1.

the direction of the magnetic force. So a single particle, or many particles, brought near one pole of a magnet stand on end, as it were; and, in the case of many particles simultaneously influenced by the same pole, they form tufts standing out from the pole, their outer ends repelling each other, but all pointing in the direction of the lines of force towards some focus of opposite magnetic polarity. In conformity with this law, the particles of ore in contact with the drum opposite one of the poles of the magnet stand on end, forming tufts, spreading away from each other at their outer ends. As they are drawn along, however, by friction against the moving drum, when they get to a point midway between two poles they lie down flat against the surface of the drum, and, as they are drawn still further along, they again stand on end—but this time the other end out. So, in passing through the magnetic field, they are tumbled end over end as many times as there are poles in the field. The result is, that every time they are reversed in position opportunity is afforded for any non-magnetic particles of gangue, which may have been entangled with the ore, to fall away from the tufts of magnetite; and this result is still further facilitated by the centrifugal tendency and by the counter-current of air.

When the ore reaches the limit of the arc covered by the magnetic field it is no longer attracted, and takes on a tangential movement, which carries it away from the drum. It has now, however, passed the edge of the second apron, and, on leaving the first drum, comes within the influence of the magnet of the second drum, where similar operations are repeated, a portion being finally discharged as concentrate at *c*. The function of the second drum and magnet being to differentiate the product from the first drum into two portions, which may be conveniently designated as middlings, discharged at *m*, and concentrate, discharged at *c*. The middling consist of particles of ore with adhering portions of gangue, which may require a little finer crushing to effect their mechanical liberation; or, they may consist in part of iron compounds having a smaller degree of magnetic susceptibility than the pure magnetite. The separation of the middlings from the mass delivered to the second drum may be effected in two ways: If the drums have the same speed of rotation, a weaker magnetism in the second magnet will allow these less magnetic particles to drop away; or, if the magnets have approximately the same force in the two drums, a higher speed of rotation of the second drum will throw these particles off by reason of the centrifugal force overpowering the centripetal magnetic attraction, the magnet having the smallest influence upon the leaner portions of the mass.

Modifications of this apparatus hav been designed, which adapt it for use in conjunction with a stream of water mingled with the ore, so constituting a wet process.

In designing this apparatus, it has been assumed that, in order to separate effectively a mass of commingled ore and gangue, containing a large percentage of fine dust, positive and contending forces must necessarily be brought into active play.

The importance and special efficiency of the means provided for suppressing the movement and discharge, along with the ore, of the of finer particls of gangue, and of the means for differnating the product into several portions graded according to the percentage of iron in each portion, and its magnetic susceptibility, should not be overlooked. It is upon the application of these means that the ability depends to perform the critical operation of converting non-Bessemer into Bessemer ores by the elimination of phosphorus-, sulphur-, and titanium-bearing compounds.

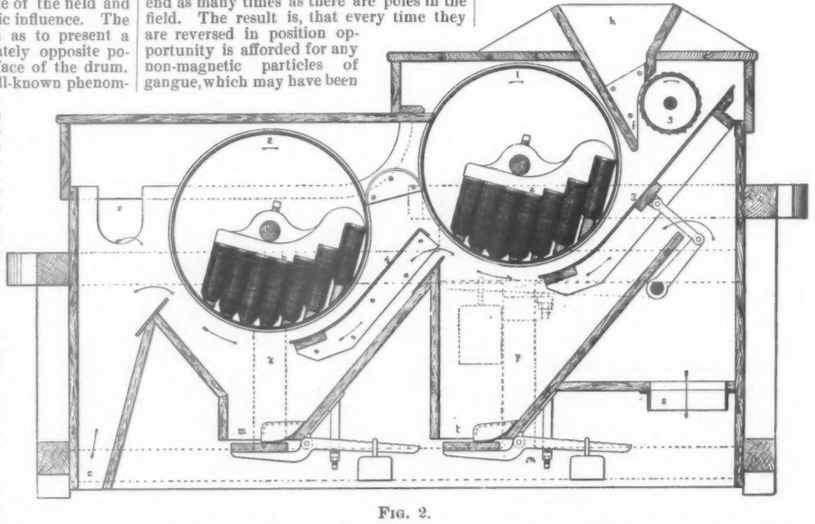


FIG. 2.

In the concentration of ores by the dry process the treatment of the dust developed in the rapid movement of large quantities of ore, is generally difficult. When the ore reaches this machine, the finer portions of the material are as readily and perfectly dealt with and separated as the coarsr, the concentrates, however finely pulveoized, being delivered from the machine in arn absolutely clean condition, and free from non-magnetic dust and the dust carried away by the air-current being also as wholly free from any magnetic material.

The peculiar action of the ore in passing through the complex or multipolar magnetic field has already been described. Upon the mode of arrangement of the poles the efficiency of the apparatus largely depends. In this machine the magnetism of the field of attraction performs a two-fold function, viz., to attract the magnetizable matter of the ore and, as it is moved through the ma-

chine by friction upon the revolving drum, to turn it over and over so as to allow the gangue to fall away, and also to permit the air-current to take effect on all sides of every particle of the ore.

If the importance of this operation is once recognized, it will be readily understood that there can be only one possible efficient arrangement of the poles, and that it is not a matter of indifference whether they conform to this or some other plan.

The positive character of the functions above enumerated renders it possible to make an effective separation under the conditions of a very heavy supply of ore to the machine. The easy working capacity of a machine having drums of 24 inches diameter and 24 inches working-face is from 15 to 20 tons per hour of ore granulated to pass 16- to 20-mesh screens.

The power required is from 1 to 1½ horse-power in electricity for each drum, and ½ to ¾ horse-power to drive the machine.

These machines have been applied to the treatment of a considerable number of ores with results shown in the appended tables. The most remarkable of these was the conversion of Port Henry Old Bed ore into a Bessemer ore, carrying Fe 71.10, P. 0.037.

TABLE A.

ANALYSES FROM TESTS WITH THE MONARCH SEPARATOR, EARLIER FORM.

| MINE. | CRUDE ORE. | | CONCENTRATES. | | TAILINGS. | | |
|---|---|---|---|---|---|---|---|
| | Fe. | P. | Fe. | P. | Fe. | P. | Per Cent. of Original Weight. |
| Benson Mine, Little River | 45.48 | 0.158 | 61.40 | 0.042 | 5.60 | 1.25 | 29.0 |
| | 41.24 | 0.25 | 63.31 | 0.042 | 5.47 | .... | ..... |
| | 40.51 | 0.19 | 63.68 | 0.045 | 3.87 | .... | ..... |
| | *43.02 | 0.19 | 62.10 | 0.032 | .... | .... | ..... |
| Port Henry, New Bed | 47.70 | 0.025 | 70.40 | 0.011 | 4.40 | 0.061 | 38.0 |
| " Old Bed, 21 | 58.30 | 2.18 | 71.10 | 0.11 | 8.70 | 10.61 | 19.3 |
| Flagler, Vt., ore | 23.74 | 0.408 | 64.87 | 0.084 | 4.13 | 0.465 | 68.44 |
| Chateaugay, N. Y. 16-mesh | 44.56 | .... | 66.69 | .... | 1.26 | .... | 44 0 |
| Chateaugay, N. Y. 4-mesh | 33.99 | .... | 59.58 | .... | 10.64 | .... | 52.0 |
| Chateaugay, N. Y. 8-mesh | 31.23 | .... | 62.11 | .... | 7.32 | .... | 61.11 |
| Chateaugay, N. Y. 16-mesh | 36.32 | .... | 66.98 | .... | 8.12 | .... | 59.0 |
| Chateaugay, N. Y. 16-mesh | †19.60 | .... | 60.48 | .... | 8.96 | .... | 84.375 |
| Tilly Foster | 50.25 | .... | 61.12 | .... | 7.88 | .... | 20.0 |
| Peach Glen, N. J., ore | ‡50.81 | 0.042 | 64.88 | 0.02 | 7.06 | 0.082 | 25.0 |

*Average of eight lots shipped from mine. The crude ore contained also: $SiO_2$, 28.31; S, 0.856; the concentrates, $SiO_2$, 5.94; S, 0.127. †Tailings from Conkling jigs. ‡Sulphur as follows: in crude, 0.031; in concentrates, .022; in tailings, 0.02.

TABLE B.

ANALYSES FROM TESTS WITH THE MONARCH SEPARATOR, LATEST FORM.

| MINE. | CRUDE ORE. | | CONCENTRATES. | | | | TAILINGS. | | ANALYST. |
|---|---|---|---|---|---|---|---|---|---|
| | Fe. | P. | Fe. | P. | $SiO_2$ | S. | Fe. | Per ct. of Original Weight. | |
| Benson Mines, Little River, 16-mesh | ..... | ..... | 68.45 | 0.022 | 4.78 | ..... | ..... | ..... | Donohue. |
| Benson Mines, Little River, 16-mesh | ..... | ..... | 67.49 | 0.016 | 5.64 | 0.32 | ..... | ..... | Donohue. |
| Benson Mines, Little River, 20-mesh | ..... | ..... | 68.62 | 0.0106 | 4.18 | 0.34 | ..... | ..... | Donohue. |
| Benson Mines, Little River, 20-mesh | ..... | ..... | 67.81 | 0.013 | 5.19 | 0.27 | *3.39 | ..... | Donohue. |
| Chateaugay tailings | 11.80 | ..... | 68.365 | 0.008 | 4.31 | ..... | 4.33 | 89 0 | Wuth. |
| Port Henry, New Bed | ..... | ..... | 70.9 | 0.0089 | 1.48 | ..... | ..... | 38.0 | Wuth. |
| " Old Bed, 21 | 58.70 | 2.25 | 71.1 | 0.037 | ..... | ..... | ..... | 20.0 | † |
| Croton, N. Y., ore | ‡42.99 | 0.153 | 69.86 | 0.021 | ..... | 0.04 | 7.95 | 47.0 | Wuth. |

*The sulphides and hornblende account for more than 2 out of the 3.39 iron in these tailings. †Witherbee, Sherman & Co.'s chemist. ‡Sulphur in crude, 0.30.

This concentration was made from the crude ore, carrying Fe. 58.7. $P_2O$ 2.25, the Bessemer concentrate representing about 65 per cent. of the original mass.

An earlier type of this machine was in use during nearly the whole of the year 1889, at Benson Mines, St. Lawrence County, N. Y., concentrating the lean magnetite mined there, which in the crude ore carries about 40 per cent. Fe, and is above the Bessemer limit in both phosphorus and sulphur. The concentrated product found a market at Pittsburgh, Pa. The analyses in Table A show the general character of the results; and those in Table B the results obtained there with the improved machines of the later type.

The new works at this mine (a detailed description of which it is hoped may be offered at a future meeting), are provided with crushing-machinery having sufficient capacity to crush daily 800 to 1,000 tons of ore, sized to 16-mesh and finer, and the separation of this quantity of ore is to be effected at the outset with three separators of the type represented in Fig. 1, having a working face on the drums of 24 inches.

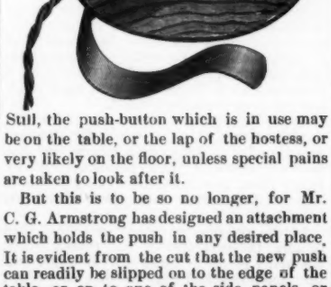
In the minds of some persons who have been studying the general subject of ore-concentration, and employing the apparatus hitherto available, inability to convert some of the well-known ores high in phosphorous and sulphur, such as Port Henry Old Bed, Little River, Croton, etc., from non-Bessemer into Bessemer ores, has led to the inference that some as yet undiscovered refinement of preparation was essential to their successful treatment. The entirely successful and economical management of these ores with this machine has proved that the essential matter in the problem was to provide a separator that would separate ore that had been properly prepared. The preparation of any particular ore being wholly dependent upon its physical and chemical characteristics, its final separation would depend upon the efficiency of the separator, which would constitute the last and supporting link in the chain of operations. It is believed that this machine offers a practical solution of the problem of concentrating magnetic ore such as has not been hitherto provided.

### Kansas Railroads.

Kansas has more miles of railroad than all the New England States put together. She has 1,159 more miles than the Empire State of New York, whose population and wealth surpass Kansas four to one. She has more than the great State of Pennsylvania, Iowa or Texas. Kansas to-day has 8,754 miles of railroads. Illinois alone surpasses her with 9,000 miles. Next comes Iowa with 8,364 miles. Following her is Pennsylvania with 8,224; then comes Texas with 8,210 miles. During the three years, from 1886 to 1888 inclusive, Kansas constructed 4,535 miles of railroads, which is more than any one of the 27 of her sister States have in operation to-day; and there are only 13 States in the Union who have a greater mileage of railroads than Kansas built in these three years.

### A New Dining-Room Push.

It would seem that so simple a thing as a push-button leaves little room for improvement or change, but this is not wholly true. In the case of the pushes used in connection with a wall or floor connection and a flexible cord, the extension part of the floor push is now considered quite essential.



Still, the push-button which is in use may be on the table, or the lap of the hostess, or very likely on the floor, unless special pains are taken to look after it.

But this is to be so no longer, for Mr. C. G. Armstrong has designed an attachment which holds the push in any desired place. It is evident from the cut that the new push can readily be slipped on to the edge of the table, or on to one of the side panels, or even on a chair. Whether the push is uppermost, or is concealed by being turned downward, it is always just where you put it. Any style of push can be furnished with this improvement, and the Great Western Electric Supply Company—an acknowledged leader in matters push—will undoubtedly find a great demand for it.

### The Westinghouse Company a Busy One.

It is a fact, which experience in the electrical business has always manifested, that during the summer months the industry is less active than during the remainder of the year. It is in the summer that the largest electric companies get an opportunity to catch up with filling those orders with which they are behind; or else they have a chance for workingahead and getting ready for the time when the heavy fall trade begins. Reports from all over the country show that this year is the greatest the electrical industry has ever known, and one of the largest companies is already so stocked with contracts for the equipment of electric lighting central station plants, for isolated plants, for electric railway equipment, etc., that the works are now being operated at their utmost capacity, day and night, with every prospect of having to continue in that way for the entire Winter. This company is the Westinghouse Electric and Manufacturing Company.

Since the company entered the field of constructing electric railway motors, especially, it has been obliged to increase its facilities very extensively. The many advantages of the company's railway motor have made it already familiar among most of the electric railway people in the country, and the result is an influx of so many contracts for street railway equipment such as has never been heard of since the electrical industry was started.

The total amount of orders for alternating current incandescent lighting apparatus received during the month of September aggregate 28,250 lights, which is over a thousand lights for each working-day. Besides this, the demand for Westinghouse alternating current arc lighting apparatus has been unusually heavy, and the company is far behind with its orders in that department. In the electric railway department it is the same. The company has orders for the equipment of forty roads, calling for machinery valued at almost one million dollars, and still the demand is increasing. The noiseless motor of the company on the Pleasant Valley Electric line, in Pittsburgh, continues to attract attention. To give an idea of the silent manner in which the motor operates, it is only necessary to remark that the officers of the street car line have been requested by residents along the route to place a bell on the axle of the car in order to make known to the people its approach, and thus prevent accidents to children.

Among the new central station plants of alternating current lighting, the Westinghouse Company has obtained contracts from Owensboro, Ind., 750 lights; Akron, O., 1,500; Bedford, Ind., 750 lights; Norwalk, O., 1,000 lights; Lykens, Pa., 750 lights; Penn Yan, N. Y., 750 lights.

In addition a number of the older central station plants have increased their capacity considerably. Among those having contracted with the company for an increase during the month of September are: Englewood, a suburb of Chicago, Ill., for 3,000 lights; Bay City, Mich., 3,000 lights; Duluth, Minn., 750 lights and Youngstown, O., 750 lights. It is remarkable in the latter case that this plant in Youngstown is not yet in operation at all. After the company was organized the management contracted with the Westinghouse Electric Company for alternating current apparatus of a capacity of 2,250 lights; but even before this machinery had been installed the management realized that the demand was greater than it had been at first anticipated, and therefore the increase was ordered.

Mr. R. T. White, of Boston, the inventor of the "Daisy" chair and the channel iron form of rail and chair, was a recent New York visitor. Mr. White has just opened an office in New York at 52 Wall street. Recent decisions of the Patent Office, Mr. White states, give him the full control of the above inventions, after a long fight in the office, and he now stands ready to prosecute all infringers of his patents. A very extensive business in this line has grown out of the development of the electric railway, and Mr. White has every reason to be elated over his success in establishing his claims.

## TELEGRAPHIC

.... Heavy freshets in Arkansas have washed away numbers of telegraph poles. A few Western Union wires are down in consequence.

.... A Meadville, Pa., paper says that the city council ordered certain telegraph poles to be "perpendicularised," and that said poles "still lean out over the street." This is truly awful.

### Delany Apparatus in Germany.

Mr. Patrick P. Delany, of South Orange, N. J., has just sent to the Imperial German Postal Department a set of his synchronous telegraphic apparatus. The Germans have never used the quadruplex or the Wheatstone.

In a letter from Mr. Preece to Mr. Delany the following passage occurs: "We are getting along splendidly here with your apparatus. Nothing can be more satisfactory than its working. We have overcome every difficulty, and some of the circuits are working as well, if not better, than those alongside them running in the old groove."

By the "old groove," Mr. Preece meant simplex working. Mr. Delany, in a recent letter, says: "This may seem strange, but it was demonstrated scores of times during a long trial on the Baltimore & Ohio road that the multiplex would work over wires inoperative by the ordinary Morse system."

### That Message Stealing Affair in Washington.

The Washington police recently discovered a newly established branch office on the Western Union lines in that city. It was located in the third story of an unoccupied dwelling on Seventh street; was equipped with a complete outfit of Morse instruments, main and local batteries; stocked with a large quantity of canned provisions, and provided with mattresses and blankets for the use of extra operators. It was opened by a company of gamblers with the intent to swindle another company of men in the same profession. The Autumn races were in progress at the Bennings race course, and the scheme had been concocted to beat the bookmakers. The leaders of the gang were a man calling himself Robert Grayson and his wife. The operators were E. F. Getty and Fred. E. Burnell, working under assumed names. The former had a few weeks previously been given a leave of absence from the main office of the Western Union Telegraph Company, in New York, where he had been employed for the last seven or eight years. having always been regarded as one of the most expert and trustworthy men in the office, Burnell was from Indiana, and had recently worked for the Postal Telegraph Company in New York. With them was Bernard McGorty, a lineman, also from New York. The gang had been in Washington several weeks preparing for the races. They had made elaborate diagrams of the lines connecting the race course and the pool rooms with the main office and with other cities, had run a number of wires from their room to a pole in front of the house, cut into the main lines and connected the instruments and batteries. Their plan was to divide the circuit, receive the results of the races and hold them just long enough to enable an accomplice to reach the pool room and place bets on the horse known to have won the race. The company, having received warning of the attempt to tap its wires, was on the watch, and the party was arrested immediately after commencing operations. When they were brought before the police court no law could be found under which they could be held and they were ordered to leave the city within 24 hours. Grayson and his wife obeyed the order with great haste, but the others stopped at numerous saloons on their way to the railroad, and, by the time they reached that place, the detectives armed with a new warrant, were waiting for them. They were charged with conspiracy to interfere with and impede the business of the telegraph company and its customers, and, in default of $500 bail, were sent to jail. The principals left their photographs and a lot of papers behind them and they will, doubtless, be caught.

* * Athens, Ga., wants an electric railway.

* * The Thomson-Houston Company is constructing 500 feet of experimental conduit in the streets of Lynn, Mass.

* * President Breed, of the Lynn & Boston Railroad, says that his purpose is to connect with Boston by electricity.

* * As one watches an electric motor, does he wonder whether a hundred years hence a horse will not be as rare as a camel or an elephant is to-day?—*New York Sun.*

* * On account of the promising outlook for the completion of the electric railroad, the prices of house lots on the Brockton road are rising rapidly.—*Whitman, Mass., Times.*

* * Several attempts have been made to wreck cars on the electric railway at Canton, O. Stones have been placed on the track, and, in one or two instances, the rascals who placed them there nearly succeeded in their designs. The company operating the road has decided not to run after night unless proper police protection is accorded.

* * The electric roads have been the means of distributing the population to such an extent that it is affecting the values of real estate. Outlaying property along the line has advanced in price, while property in the crowded center has declined very perceptibly, and houses in the vicinity of the Viaduct which have found ready tenants for years are now empty.—*Cleveland Times.*

* * An enterprising firm in Memphis, Tenn., is employing the "guess" advertising scheme in connection with the electric railway now building. Their advertisement in the local papers contains a guess coupon which the guesser is requested to fill out, giving his opinion as to the day, hour, minute and second when the first electric car will pass the store of the advertiser. This is positively the latest advertising dodge.

* * The copper mines at Vershire, in the Eastern part of Vermont, have been pumped dry and large gangs of miners are working in them night and day. To light the mines and the smelter, an electric light plant has been put in. The houses have been repaired and painted, and are now filled with workingmen and their families. The opening of the mines has made a good market for the farmers, and the abandoned farms will be wanted. The mines formerly employed 300 men.

* * The Utica and Mohawk Railway Company, which recently contracted with the Edison Company for five cars and a station equipment, has now been in operation for about three months with most satisfactory results. Its picnic business has been very large, the road on some occasions carrying 10,000 passengers per day. The wisdom of President Mann's new departure has been thoroughly demonstrated. It is worthy of note that under Mr. Mann's management, this road has become one of the best equipped and best paying properties in the State, and this example shows the value which can frequently be found in a run-down horse car line.

* * A large contract for electric railway equipment has been made with the Edison General Electric Company by Thomas Lowry, president of the St. Paul and Minneapolis Railway Systems. It will be remembered that early in the year Mr. Lowry placed with the Edison Company the largest single contract for railway apparatus which has ever been given to a railway company, calling for over 7,000 horse-power of electrical apparatus. The contract just closed provides for 15 No. 60 Edison dynamos of 150,000 watts (200 horse-power) each, and 20 cars for use between St. Paul and Minneapolis, the latter being required to make a speed of 25 miles per hour.

## Electric Power-Transmission in Mining Operations.

BY H. C. SPAULDING, BEFORE INSTITUTE OF MINING ENGINEERS, NEW YORK, SEPTEMBER, 1890.

The rapid increase, during the last few years, in the number and magnitude of applications of electric power-transmission to commercial uses in this country, has been due principally to three causes; first, the ability and enterprise of those who have been identified with the progress of electrical industries, since electric illumination became an economic fact instead of a laboratory-experiment; secondly, the readiness of the American people to adopt new and advanced methods as soon as their superiority has been fairly demonstrated; and thirdly, the economy and flexibility of the apparatus employed, when properly designed and constructed, and installed under suitable conditions.

Basing our judgment on the world's advance in scientific developments during the past century, we may reasonably conclude that in no other country would the pioneers of electrical invention, whose names have now become household words, have received the prompt and plentiful financial support which has enabled them to inaugurate undertakings of exceptional magnitude, even in this era of tremendous monetary organizations. And, on the other hand, we have seen, in the numerous financial and engineering failures inseparable from such rapid development, the natural results of a too implicit faith in electrical omnipotence.

It is not to be wondered at that conservative engineers have been slow to adopt this new and mighty agent in the solution of extensive problems, and under circumstances where a single failure means not only a greater or less financial sacrifice, but the loss, in a greater or less degree, of professional reputation.

The mechanical engineer, while recognizing the fact that thousands of horse-power are to-day transmitted by electrical means, from running the lathe in a dentist's office to the operation of a fifty-ton traveling crane; from passing a cooling draught of air through a sick chamber to printing the plethoric sheets of our daily papers, hesitates, nevertheless, before placing reliance upon a system which has undeniably had its failures.

The mining engineer looks with interest upon the statement that 258* electric roads in the United States alone, with 1,927.26 miles of track, and 3,024 cars are in daily service or under construction, and then compares the demands of street service with those found in mining practice, looking meanwhile for practical suggestions from those who have "been there" and can hold up a warning or beckoning finger to the traveler in this unfrequented path. It is the object of this paper to present briefly some of the work already done towards the application of electrical apparatus to mining processes, as well as to embody some practical suggestions and statements from those who have had personal experience in the operation of such apparatus.

Following the natural order of operations, let us consider drilling and cutting machinery in the first place. Fig. 1 shows the drill manufactured by the Diamond Prospecting Company, of Chicago. This is designated by them as a Type "R" machine, nominal capacity 300 feet, and equipped with a motor of three horse power rated capacity. The total weight of the machine, set up and running, is 1,000 pounds, and the heaviest piece, when taken apart for shipment, weighs about 170 pounds. The machine is mounted on trucks fitting the gauge of the mine-track for easy handling, and can be taken apart in fifteen minutes, and put up in a half-hour without difficulty.

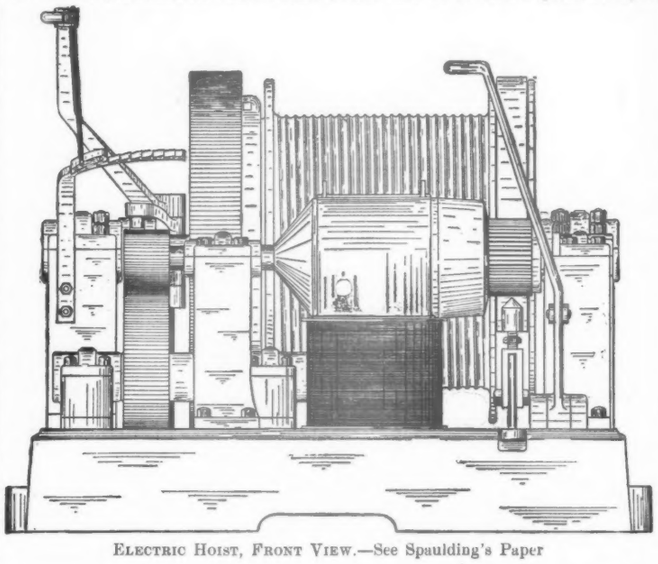
The drill swivels so that holes can be put in at any angle, and can be operated in a space giving five feet in the line of the drill-rods.

The general arrangement of electrical and mechanical parts is sufficiently evident from the illustration, though the pump is hidden by the pedestal on the right. This is operated by the horizontal shaft driven by the bevel-gearing shown, and supplies a constant stream of water to the diamonds through hose connected with the top of the drill-tube. In a recent test on a granite boulder, hole 1½ inches in diameter, with slow speed, this drill cut 22 inches in 40 minutes. When set up in the mine and working on hard compact limestone, it cut the rock at the rate of 1 inch per minute, not including stoppages for changing the rods.

For general prospecting purposes this drill seems to meet satisfactorily the requirements of its special line of work.

The general principle of construction of most electro-dynamic machinery provides us with a rotary motion, which it is necessary to transform to a reciprocating in order to obtain drills of the Rand or Ingersoll type. Any such transformation, however, entails a considerable loss of power, and we are happily relieved of this necessity by recent inventions which are based on the general characteristics of the solenoid.

Fig. 2 shows such a drill, constructed under the patents of H. N. Marvin, of Syracuse. Mr. C. J. Van Depoele, of Lynn, Mass., was one of the first to appreciate the demand for this class of apparatus, as well as the possibilities of the principle involved; and a large factory is under course of construction by the Thomson-Houston Company, which will be especially devoted to drilling and pumping machinery of the reciprocating type.



ELECTRIC HOIST, FRONT VIEW.—See Spaulding's Paper

A description of the general features of these drills will be found in the communication of Mr. Van Depoele, below.

Many machines have been placed upon the market, in recent years, for making the under cut in soft-coal mining. Several of them have met with a certain degree of success in clean and easily worked veins, steam or compressed air (generally the latter) being the operating force. Perhaps the most successful of these machines has been that manufactured by the Jeffreys Mining Machine Company, of Columbus, Ohio; and a communication from Mr. Doe, their engineer, will be found appended.

Appreciating the advantages of electric power for this class of work, Mr. Jeffreys was not slow in adopting a motor, and has used a number of those manufactured by Foree Bain, the coal-cutter being modified somewhat to utilize this power to the best advantage.

In the opinion of many practical coal miners, the principle of the rotating drill has many points of superiority in under-cutting machines, and Fig. 3 shows the result of considerable experimenting and outlay in this direction by the Hercules Mining Machine Company of Pittsburgh. A series of drills is operated by a Tesla alternating motor, the power being transmitted by a belt as shown, and the current being supplied to the motor by three armored cables. When in operation, the cutter is clamped upon rails parallel with the face of the coal, being shifted along this track after each cut ready for another.

Compressible springs are wound upon each drill-rod, and served as conveyers for the coal dust cut out by the drills.

A machine also embodying the boring principle, though entirely different in its mechanical and electrical design, is shown in figure 4.

A Thomson-Houston motor of a special type is used in this machine, current being supplied from the main entry wires (which may also be used for lighting, haulage, and pumping) by flexible wire-covered cables.

The series of cutters (nine in number, each four inches wide) is so arranged as to cut close to the wall beside which the machine is placed, and within ⅛ inch of the level of the floor.

Although the weight of the apparatus complete is less than 1,400 pounds, no clamping is needed, as the drills will "pull themselves into the coal," with only the friction of the machine behind them as it rests on the floor. The device for clearing the drills of coal dust is as simple as it is effective. It consists of a series of hinged scrapers hung from the under side of reciprocating bars, one of which is placed between every pair of drills, and which also operate an ingenious device for cutting out the triangular space left by the drills at top and bottom of the cut. The present type of machine makes a cut three feet wide, five feet deep, and four inches thick in two minutes and a half, including withdrawal of the drills. With these figures in mind, the claim of 180 tons capacity per day for this machine does not seem excessive. As the extreme height of the apparatus is only 23½ inches, it can be used in a vein of any thickness, and two small drums are so placed in the rear of each machine as to enable it to draw itself on to a truck which accompanies each machine, ready for moving into another chamber.

A simple but ingenious rotary drill is being constructed for operation in connection with this apparatus, deriving its power from it by a flexible shaft, and drilling the blast-holes at the same time that the vein is being undercut.

Having thus briefly examined the present electrical apparatus for boring into ore or coal, so that it may be blasted out, let us see what means are at disposal for hauling it out of the mine, or from one point to another under the surface. Of course, in the majority of cases, the blast will be fired by the electric current, but a discussion of this application hardly comes within the scope of this paper.

To Mr. W. M. Schlesinger, of what was, at the period referred to, the Union Electric Company, is due the honor of constructing the first electric locomotive for strictly mining uses in the United States. This was of 35 horse-power rated capacity, and was put in by the Lykens Valley Coal Company, Lykens Valley, Pa.

A series of iron rails were joined together to form a conductor for the current, which, after passing through the motor, completed its circuit to the generator by the track-rails, which were connected also by copper wires.

A locomotive of 40 horse-power capacity has been in operation at the Hillside Coal Company's Erie Colliery, near Scranton, Pa., and the installation is fully described here as showing very fairly the conditions to be fulfilled by this class of apparatus in the anthracite coal-regions of Eastern Pennsylvania.

The power-plant consists of a standard Armington & Sims engine capable of developing 60 horse-power, and a 50 horse-power Thomson-Houston generator wound for a current of 220 volts potential, and the necessary appliances for its operation. The engine- and dynamo-room at the top of the shaft are in charge of the engineer and assistant, who operate the other mining machinery.

From the dynamo to the foot of the shaft the current is conducted by No. 0 Clark wires, enclosed in gas-pipes to protect them from damage. From the bottom of the shaft the wires are carried overhead, about 12 inches outside of the low rail of each track, and are suspended from an insulator specially designed for this class of work, the construction of which can be readily seen from the accompanying illustration (Fig. 7).

Wherever turnouts occur, frogs (shown in the cut) are used, the conductors being soldered to them in the same manner as when used for street-railway work. Connections from the mains to the overhead conductor are made at suitable intervals, and a portion of the current is utilized for lighting purposes, two 110-volt lamps being placed in series. There are 50 of these lamps—eight at the foot of the shaft, two in the pumping-room, four in the blacksmith shop, and two in the slope-room; the remainder being distributed along the gangway, as shown by the black dots in Fig. 8, Plate I.

The rails are used as conductors for the return-current, copper end-connections effecting a complete metallic circuit. In adapting the tracks to the electric system it was found necessary to make a few changes to accommodate the increased output. The shaft-sidings, as shown in the plan, will accommodate 70 loaded cars and 50 empties, whereas, before, they had a capacity for but 15 on each side. The profiles and plan of the tracks will be seen from the diagram (Fig. 8). The track from X to R, or foot of the rock-plane, is 36-inch guage. The other tracks are double-guage, or three-rail tracks, the guages being 36 and 28 inches. They are made in this manner to accommodate the slope-wagons, which are all of the narrower guage.

The locomotive shown in the illustrations (Figs. 5 and 6) embodies many new features in motor-construction and general design, and, under practical test, has shown that it is particularly adapted to the work required of it. It is built for a three-feet gauge, and is of the following dimensions: Length over all, nine feet seven inches; width, five feet three inches; height, five feet six inches. This last dimension can be

*August 1, 1890.

considerably reduced by placing the rheostat at one end instead of on the top, as has been done in the present instance. The weight of the locomotive is 10,500 pounds, to which 1,800 pounds has been added to increase traction. The motor employed is of the type "G" railway motor of 40 horse-power.

A novel trolley-arm is used, which requires no attention when the motor is reversed. Its construction is such that a wide variation in the position of the conductor is permissible, a range of three feet six inches being easily covered, while the meeting of an obstruction simply causes the trolley-arm to fall by the side of the car without resulting in any damage. From the trolley-wheel the current passes along the arm to the fuse-boxes, then through the rheostat and motor to the rail. Pinions on the armature-shaft mesh with intermediate gears, connection between these and slotted connecting-rods being made through the ordinary crank-pin and box. This arrangement allows for variation in position between the wheels and body of the locomotive which carries the motor; and, as the crank-pins on opposite sides are placed at an angle of 90 degrees, there are no dead points. The brake mechanism, rheostat and reversing-switch may be operated from either end by the hand-wheels shown in the cut. The operator has everything under complete control, and can start or stop the car and reverse its direction without moving from one position.

The locomotive is run by one man, who is assisted by a boy in making up the trains and turning the switches. It displaces seven mules and three drivers. During a period of 11½ days the average number of cars delivered at the shaft-bottom by the locomotive was 559.5, against 536.95 per day delivered by mule haulage, much time being consumed by waiting at the bottom of the shaft for empty cars. Thus far, the locomotive has shown that it will increase the daily output to 700 cars per day. The operations are as follows:

EAST OR SLOPE SIDE.

| | |
|---|---|
| Distance run per trip, including making up, etc | 2,884 feet |
| Time of trip | 10½ min. |
| Cars per trip | 15 |
| Trips per day | 16 |
| Miles run per day | 8.73 |
| Total time | 2 h. 40 min. |

Locomotive reversed 128 times per day.

WEST OR PLANE SIDE.

| | |
|---|---|
| Distance run per trip, including making up, etc | 2,546 feet |
| Time of trip | 6½ min. |
| Cars per trip | 20 |
| Trips per day | 25 |
| Miles run per day | 12.55 |
| Total time | 2 h. 50 min. |

Locomotive reversed 104 times per day.

To deliver 700 cars per day of 10 hours, the time of running the locomotive is five hours and 30 minutes, leaving four hours and 30 minutes for contingencies. The total distance run is 21.28 miles, and the locomotive is reversed 232 times.

The pump, as shown, consists of three vertical cylinders, within which are three single acting plungers, their cranks being hung from the main shaft at 120° angles, in order to produce the most even application of power. In addition to this class of pumps for general hydraulic work, the Van Depoele type of reciprocating engine is being adapted to a sinking pump which has, as yet, not been sufficiently tested to warrant further mention here.

I need hardly mention the subject of ventilating apparatus, as the application of motors to revolving fans of any kind is a mere question of belts or gears, though the fact that the fan, with its motor, may be located at any desired point within the mine, with an expenditure of power hardly greater than would be necessary outside, has a marked bearing upon the general arrangement and efficiency of ventilating systems.

TESTS ON GOULD PUMP, July 31, 1890.

| Pressure, lbs. Per Square Inch. | Gallons Per Minute..... | 100 | 125 | 150 | 175 | 200 | 225 | 250 |
|---|---|---|---|---|---|---|---|---|
| 0 | Electrical H. P. | 1.2 | 1.5 | 1.8 | 2.2 | 2.7 | 3.3 | 3.9 |
| | Mechanical H. P. | .12 | .16 | .18 | .21 | .23 | .26 | .26 |
| | Efficiency | .10 | .10 | .10 | .10 | .071 | .071 | .072 |
| 20 | Electrical H. P. | 2.91 | 3.67 | 4.16 | 5.06 | 5.87 | 6.56 | ..... |
| | Mechanical H. P. | 1.38 | 1.74 | 2.09 | 2.42 | 2.83 | 3.10 | ..... |
| | Efficiency | .48 | .47 | .50 | .48 | .48 | .47 | ..... |
| 50 | Electrical H. P. | 5.16 | 6.52 | 7.75 | 8.98 | ..... | ..... | ..... |
| | Mechanical H. P. | 3.11 | 3.95 | 4.75 | 5.52 | ..... | ..... | ..... |
| | Efficiency | .602 | .606 | .612 | .615 | ..... | ..... | ..... |
| 75 | Electrical H. P. | 7.30 | 8.64 | 10.48 | ..... | ..... | ..... | ..... |
| | Mechanical H. P. | 4.69 | 5.79 | 7.06 | ..... | ..... | ..... | ..... |
| | Efficiency | .643 | .670 | .674 | ..... | ..... | ..... | ..... |
| 100 | Electrical H. P. | 9.21 | 11.54 | 12.25 | Speed of pump, 27 revolutions. | | | |
| | Mechanical H. P. | 6.16 | 7.77 | 8.36 | ..... | | | |
| | Efficiency | .670 | .673 | .682 | ..... | | | |
| 125 | Electrical H. P. | 11.29 | 13.88 | ..... | | | | |
| | Mechanical H. P. | 7.74 | 9.37 | ..... | | | | |
| | Efficiency | .686 | .675 | ..... | | | | |
| 150 | Electrical H. P. | 14.02 | 15.16 | Speed of pump, 22 revolutions. | | | | |
| | Mechanical H. P | 9.17 | 10.19 | ..... | | | | |
| | Efficiency | .654 | .672 | ..... | | | | |

The efficiency in this table is the mechanical, divided by the electrical, horse-power.

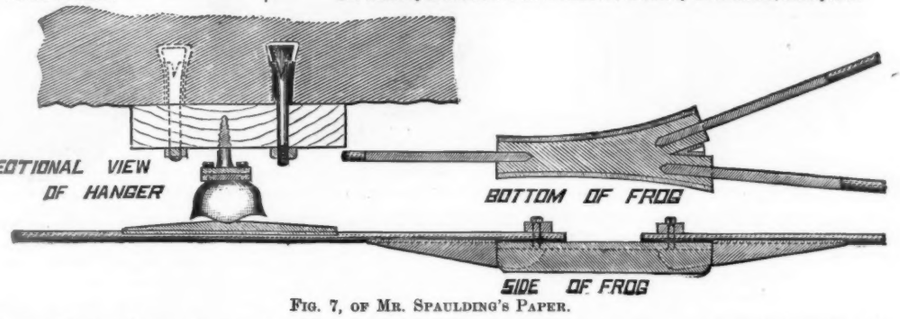



FIG. 7, OF MR. SPAULDING'S PAPER.

The Thomson-Houston Company has now under construction for another Pennsylvania mine, a locomotive of 60 horse-power capacity, which (although of the same general type) will be so modified in design as to stand only four feet in the clear, above rails, the gauge being three feet.

The same general plan is applicable to mine-tramways of even 12 or 18 inches gauge, suitable for narrow entries, such as are found in some of the western gold and silver mines.

For hoisting purposes, we may have a variety of forms and sizes, from a three-horse whip for hoisting small buckets, to a machine capable of operating a full-sized cage under its maximum load. Fig. 9 shows a hoist of the Webster, Camp & Lane make, equipped with a motor, for use in the Ashland iron mine, at Ironwood, Michigan, while Figs. 10 and 11 show different views of a line of electric hoists recently put upon the market for miscellaneous uses and ranging from 10 to 80 horse power.

In the Castle-Gate mine, Utah, a 35 horse power Lidgerwood Thomson-Houston hoist is located about 1,000 feet inside the main entry, for handling the trains at that point.

In pumping machinery a peculiar apathy seems to exist among prominent manufacturers as to the demands of this kind of work. There are, of course, innumerable cases where centrifugal and plunger-pumps have been belted or geared to motors to accompiish certain objects; but the pump shown in Fig. 12 is the first of considerable size which, to the writer's knowledge, has been designed with special reference to operation by electric power, and which is in itself a mechanical unit, so to speak.

This pump is manufactured by the Gould Manufacturing Company, of Seneca Falls, N. Y., and the table of tests given below shows its efficiency when operated by a 15 horse power motor of special winding. These tests were made with a view to determining the general fitness of the type for deep mining pressures, and the results have been considered sufficiently satisfactory to warrant the designing of a standard line of pumps of from 50 to 500 gallons per minute capacity.

In addition to this class of apparatus, it may be said that no type of machinery will answer more quickly to sudden demands upon its capacity, or give a plainer indication of continued abuse; while, on the other hand, no system of power transmission is capable of more rapid repair in case of temporary derangement. We have but

The question of lighting, also, though a most interesting one to the engineer and operator, hardly falls within the scope of this paper. It is sufficient to call attention to the fact that the same wires which furnish current for a part or all of the apparatus enumerated above, will make the interior of the mines as light as day, and give a beneficial result, not only directly in the amount of product, but indirectly in the satisfaction and comfort of the men. This is not theory, but has been demonstrated to the satisfaction of all concerned, and in cases where there was, at the start, among the miners themselves, a hearty and bitter opposition to the new system.

Before considering the question of surface arrangements, let us pause a moment, to answer the oft-repeated question as to danger.

The danger of accident from any class of electric machinery in mining operations, is of three kinds; first, physical injury from contact with conductors or apparatus, through which a current is passing; secondly, danger of fire or explosion from a spark in some part of the electrical apparatus; and, thirdly, failure of the apparatus to work properly at critical moments. Regarding the first point, it may be said that a limit of 250 volts has been fixed by many experts in mining and electrical engineering for all apparatus to be used below the surface; and that permanent injury from a current of this tension, regardless of its amount, is absolutely impossible, the only liability to danger lying in secondary and indirect accidents, owing to the surprise and momentary discomfort due to an accidental shock. A hot steampipe carries more danger for the man who unexpectedly touches it than a bare copper wire carrying enough current to cut and haul 2,000 tons of coal a day at the voltage named above. As to the second source of danger, no electrical apparatus, if properly installed, should ever spark at known and properly-guarded points; the amount of protection at these points being entirely dependent upon the knowledge of the designer, faithfulness of the operator and common sense of the purchaser, in spending sufficient money on safeguards. As to the third point, no class of apparatus ever designed is free from the possibility of accidental derangement, and at critical moments. But of electrical apparatus, it may be said that no type of machinery will answer more quickly to sudden demands upon its capacity, or give a plainer indication of continued abuse; while, on the other hand, no system of power transmission is capable of more rapid repair in case of temporary derangement. We have but to compare the work of mending a broken air or steampipe, or splicing a parted cable, with that of making a simple twist in a broken wire, and we need not wonder at the recent prophecy of a prominent naval officer, that coming warships would carry no steam outside their boiler and engine room.*

Let us consider now the demands of the generating system which will enable us to furnish the proper current to our apparatus to the greatest advantage.

If we have an abundant and steady water-power at hand so much the better, as the expense of maintenance then becomes practically a matter of interest on investment. If, on the other hand, we must rely on steam, let us be sure and have ample boiler capacity to begin with. Many an electric installation has been condemned by casual observers when the fault lay between the coal pile and the dynamo belt. It is, however, the province of this paper to consider, not the generation of mechanical energy, but its transmission; and, accordingly, attention will be given first to the current-generators.

Figure 13 shows a generator of 85 horse-power capacity, suited for mining work, manufactured by the Thomson-Houston Electric Company. It is equipped with sliding base, and self-oiling bearings, and weighs 10,000 pounds.

Mounted on brick or stone foundations, in a dry, cool room, free from flying dust of any kind; these, with A 1 oil and *cleanliness*, should need practically no attention except at starting and stopping.

Cheap machines will not answer for mining work. One cannot shut down for a few hours whenever it is desirable to have a new commutator put on, or a little shellac and braid here and there; and a thousand dollars more on the original investment is a good deal better than six or seven hundred a year for repairs.

* Some of our latest additions to the navy have more than twenty steam-engines for hoists, pumps, etc., in different locations, any one of which might be rendered useless by a stray shot, not to mention the demoralizing effect of escaping steam, while the wires of electric apparatus for the same purposes may be almost instantly repaired.

(*For Conclusion see foot next column.*)

Plates II., III., and IV., show, respectively, the front and end elevations and floor-plan of a power plant just erected by the Pleasant Valley Coal Company, at Castle Gate, Utah, which is, in many respects, a model of its kind.

It has a capacity of about 750 horse power of generating machinery, which will be used for furnishing current to electric coal cutters, drills, pumps, haulage engines, ventilating fans, etc., the entire power needed for the various mining operations being transmitted electrically. As this is the first plant of such magnitude employing electric apparatus to the exclusion of other systems, the result will be watched with interest.

I append some communications kindly furnished by gentlemen who have given special attention to various branches of the subject of this paper. To these, as well as to others who have furnished various data of interest, I wish to express my thanks.

## ELECTRIC LIGHT NEWS

—— Work on the new Schuyler plant at Monroe, Mich., is progressing very rapidly and it is expected to start about the 15th of this month.

—— At St. Joseph, Mo., recently an electric light tower 75 feet high was moved 150 feet without taking the tower apart or interfering with its lighting service.

—— The Hagerstown Electric Light Company, of Hagerstown, Md., owing to the increased demand for arc lights have added to their plant a 45 light Schuyler equipment.

—— The President has approved the act authorizing the Texas-Mexican Electric Light & Power Company to erect wires across the Rio Grande River at Eagle Pass, Texas.

—— The officers at the Charlestown Navy Yard have petitioned the navy department for electric lights in the barracks, and in all probability they will be put in in a couple of weeks.

—— The National Tube Works Company are having 30 arc lights placed in their yard at McKeesport, Pa. This move was made necessary by the shortage of natural gas, which has been used as an illuminant.

—— The Electric Light Company at Dallas, Tex., have been compelled to replace all the arc light globes in the city, those in use during the cricket plague having been ruined by permanent discoloration or by breaking.

—— Electricity will supersede gas in the lighting of the Indianapolis, Ind., public library this week. The wires are being put in now. The electric light company contracts to light the building as cheaply as the gas company has in the past.

—— The selectmen of Rockland, Mass., have received notice from the State Gas Commissioners that a hearing will be given on the appeal of the Rockland Electric Light and Power Company from the decision of the selectmen granting permission to the Electric Light and Power Company of Abington and Rockland to set poles and run wires in the streets of the town of Rockland, and refusing the same permission to the appellants.

—— The Brush Electric Company, which some time ago sued the Municipal Electric Light & Power Company, of St. Louis, for infringing the Brush double carbon lamp patent, on September 27th filed a motion for a preliminary injunction. The Municipal Company is using a lamp patented by J. J. Wood, which is constructed to hold two sets of carbons, one set being held out of commission until the first carbons are burned. This device of Wood's was patented April 22, 1890. In support of the motion the Brush Company filed affidavits of Alonzo W. Dutton, their local agent; Alexander W. Meston, an electrical engineer, and Henry Morton, of Hoboken, N. J., who claimed that the differences between the Brush patent double carbon lamp and the later patented Wood lamp are details of arrangement merely and are not essential differences.

## The Engineer's Congress.

The week beginning September 29th was a busy one for the American Institute of Mining Engineers and the visiting scientific men. About 200 of them attended the opening meeting at Chickering Hall on Monday. Mr. J. F. Lewis, chairman of the local committee, opened the convention and was followed by ex-Mayor Abram S. Hewitt, who welcomed the distinguished visitors. The morning was spent in the reading of papers while the afternoon was devoted to excursions to places of interest in and around New York. More papers were read in the evening and an informal reception was held at the Park Avenue Hotel.

Tuesday was a particularly busy day, the American Institute of Mining Engineers holding three sessions. In the morning Mr. Hollon C. Spaulding, of the Thomson-Houston Motor Company, Boston, read an interesting paper on "Electric Power Transmission in Mining Operations." Other papers occupied the day and most of the evening sessions. After the adjournment of the evening session, the council of the Institute held an executive meeting.

On Wednesday the British Iron and Steel Institute's meeting was opened by Sir James Kitson, the president. Mr. Andrew Carnegie was present. After Sir James Kitson's address, Gen. Sherman came into the hall and was introduced to the meeting. The election for a new president resulted in the choice of Sir Frederick Abel. Mr. Hewitt was prevented by illness from delivering the formal welcoming address, but printed copies of it were distributed. It was long, but interesting and carefully prepared. After a paper on "Blast Furnaces" had been read the morning session adjourned. The afternoon was taken up with a trip on the Hudson.

Over 250 engineers were present on Thursday morning when the next session of the British Institute was called to order. The proceedings commenced with a discussion of papers previously read, and was participated in by a number of distinguished gentlemen. Mr. Hewitt, who had recovered from his illness, was in attendance, and Sir James Kitson presented him with the Bessemer gold medal for his distinguished services to the iron and steel trade. Papers were read during the remainder of the morning. In the afternoon a eulogy on Alexander Lyman Holley was read by Mr. James Dredge. The Holley memorial statue in Washington Square was unveiled at 4 o'clock by Alexander Holley Olmstead, a grandson of Mr. Holley. In the evening the members of the Iron and Steel Institute entertained their American friends at Delmonico's. The German delegates meanwhile were enjoying themselves at the Leiderkranz Club where Carl Schurz made them an address.

The last session of the British Institute was held Friday. Before the morning session began, Dr. Schuyler S. Wheeler escorted a number of the European visitors to the Western Union offices, the Telephone Exchange and to several electric light plants. Papers on aluminium started the morning session. Professor Elihu Thomson delivered an address on "Electric Welding." After a few more addresses, Sir James Kitson presented a set of resolutions thanking the American Institute of Mining Engineers, the various local committees, and others for the courtesies extended to the Institute, which had made the New York meeting "one of the first of the present age." After adjournment, excursion parties started out on the regular daily tour. An account of the visit to Mr. Edison's laboratory is given in another place.

The English and German visitors left for Philadelphia on a special train on the Pennsylvania Railroad at 9 o'clock Saturday morning. They will visit Pittsburgh, Chicago, and other parts of this country and Canada.

—— A ten-years' electric light franchise has been granted by the common council of Oconomowoc, Wis., to Messrs. Wilsey, Jennings, Peacock, Brown and Tuttle, all Oconomowoc men. The plant will be put in immediately.

## INDUSTRIAL NOTES.

**The Chicago factory** of the Western Electric Company is said to be the largest of its kind in the world. The building runs along Clinton street for 609 feet, is seven stories high and has 204,000 square feet of floor space.

**Chas. A. Schieren & Company,** 45-51 Ferry Street, New York, have just finished the two immense leather belts ordered about six months ago by the Louisiana Electric Light Company, of New Orleans. It will be remembered that the order was for 160 feet of 72 inch, and 550 feet 48 inch double leather belting. The 72 inch is said to be the largest belt of its kind in the world. Another belt, just like the 72 inch, has recently been ordered of Messrs. Schieren & Company by the same company. Schieren's perforated electric leather belting is receiving general favor for electric railway power stations, and orders are being booked daily.

**W. H. Gordon & Company,** 115 Broadway, New York, have taken the general agency of an automatic clock and cut-out, which is meeting with general favor. The show windows of the store, 777 Broadway, have recently been fitted up with 10 incandescent lights. The United States Electric Light Company put in an automatic clock and cut-out which extinguishes the lights at midnight (or as soon before as necessary), thus saving the expense to the consumer of using the lights later than necessary and also saving the cost and trouble of a man to extinguish them at the desired hour. This is a case where the purchaser was looking for just such a device, before adopting electricity for illuminating purposes at night. The number of show windows throughout the country which are wired and fitted for electricity, but which are not used on account of the aforesaid expense, is very large. To such the automatic clock and cut-out is a boon, as well as a profit to the electric light companies.

**Among the recent railway contracts** closed by the Edison General Electric Company may be mentioned the following: The Minneapolis Street Railway Company, of Minneapolis, Minn.; The Savannah Street and Rural Resort Co., of Savannah, Ga.; The Dallas Consolidated Traction Co. of Dallas, Tex.; St. Johns City Railway Co., St. Johns, N. B.; James Street Belt Line Railway Co., of Seattle, Washington; St. Paul City Railway Co., St. Paul, Minn.; Tacoma Railway & Motor Company, of Tacoma, Washington; Richmond City Railway Co., of Richmond, Va.; Utica & Mohawk Railway Co., of Utica, N. Y.; Elmira & Horseheads Railway Co., of Elmira, N. Y.; Elgin City Railway Co., of Elgin, Ill.; People's Street Railway Co., of Scranton, Pa.; Fort Scott Railway Co., Fort Scott, Kan.; Louisville Railway Co., Louisville, Ky.; Pittsburgh Railway Co., Pittsburgh, Pa.

## PERSONAL.

Colonel A. W. Crandall, the prominent telephonist of New Orleans, accompanied by Mrs. Crandall, was a recent New York visitor.

Mr. Cyrus O. Baker, Jr., and wife sail this week for Europe, to be absent six weeks. Mr. Baker will be missed in electrical circles, where his friends are legion.

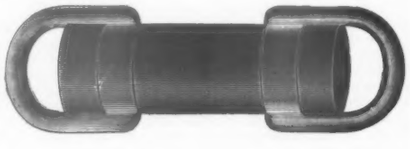
Alexander von Babo, representing Seimens & Halske, of Berlin, has taken commodious quarters in the *Times* building of this city. We predict that the American branch of this great concern will meet with a large success under Mr. von Babo's management.

Mr. H. Durant Cheever, secretary of the Okonite Company, was married October 1st to Miss Maud R. Barnard, daughter of Colonel George M. Barnard, of Boston, the ceremony taking place at noon, in King's Chapel, Boston. After an extensive tour in the South, Mr. and Mrs. Cheever will take up their residence in this city. Mr. Cheever is a popular and successful young man, and is being congratulated by hosts of friends.

## Englund's Center Curve Insulator.

The insulator shown in the accompanying cut is for use where unusual strains have to be met. The managers of the Electric Merchandise Company, Chicago, who are the owners of this patent, have during the last few years experimented very largely with a view of securing a center curve insulator which, while being neat in appearance, would have the requisite strength needed for all demands.

An objectionable feature has always been that to get the needed strength it has been necessary to have the insulator so heavy that it was unwieldy to handle and heavy in appearance on the line, and if attempts were made to lighten it, openings had to be made which, filling with rain and snow, have destroyed the insulation.



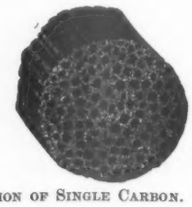
These objections are done away with in the insulator illustrated. Apparently, it is a solid but very neat coil of rubber of but nine inches in length, and when placed on the line is scarcely discernible. It is, however, protected on the inside of the rubber so securely that it will stand any strain which may be put upon it even to holding the extreme ends of the line. As a perfectly reliable device for its purpose, both for strength and insulation, it is a very superior article.

## The Fibrous Battery.

BY J. HART ROBINSON.

The ordinary gravity battery is without doubt the best known for close circuit work at the present time. Many modifications of it have been brought out within the past few years; but as they have been chiefly in the way of trying to separate the sulphate of zinc from the sulphate of copper mechanically—as in the case of using porous cups—they have not taken the place of the plain old crowfoot. It is a question whether a battery in which the sulphates of zinc and copper are used, if separated from each other by a porous shield, should be called a gravity battery, at any rate where constancy of current is necessary the use of porous jars should be entirely discarded, as the variations in resistance, due to the unequal consistency of the cups, precludes all possibility of getting a steady current.

In the case of open circuit batteries the porous cell is not so objectionable, especially where the energy of the battery in doing useful work is only expended a few seconds at a time, but, where it is essential to have a comparatively steady current for a few minutes, as in the case of telephoning—the less clay, the better the result. As an illustration: take the prism Le Clanche battery. What single fluid battery ever gave as good a result in telephony?



FIGS. 1, 2 AND 3.—VIEWS SHOWING SPIRAL CARBON, ROD CARBON AND MAGNIFIED CROSS SECTION OF SINGLE CARBON.

It is really too good for ordinary work, such as bell ringing, where constancy is of very little account; but in any case where something has to be done it can always hold its own. Commercially, many attempts have been made to supercede the Le Clanche battery, but as they have been mainly in the way of giving a very large surface of very poor carbon they have only been successful to a limited extent.

Something more than surface of carbon is necessary for a standard open circuit battery, and, as polarization is the "bug" of all open circuit batteries, the mere fact of having lots of carbon wont kill it.

The manganese in the prisms of the Le Clanche cell containing a large amount of oxygen causes polarization to take place much slower than when granula carbon alone is used for the negative element.

The result obtained by the use of prisms in the Le Clanche battery is obtained to a much greater degree in the fibrous battery illustrated here, but in a much different way.

The irregular corrugations of the fibre from which the carbon is made delays polarization and gives at least the same result as is obtained by the use of prisms in the Le Clanche cell, but in a more natural way, the carbon itself, unlike the ordinary granular article, doing what is done artificially in the above mentioned cell.

A glance at the magnified cross section of carbon shown in cut gives a general idea of the immense surface exposed to the action of the exciting fluid.

The large surface is of course no criterion to go by unless accompanied by a correspondingly low resistance in the solid matter contained in the spirals or rods that go to make up the complete cell.

The special carbon used in the fibrous battery is made from almost any kind of vegetable fibre, the process of preparing and carbonizing of which is very simple, and, as waste material can be utilized to a great extent, the cost of manufacturing is reduced to a minimum.

Further details as to resistance, electromotive force and quantity will be given later.

One of the cuts shows the carbon in a spiral and the other in a rod form.

## Some New Electrical Specialties.

The Nassau Electrical Specialty Company, 19 Park Place, this city, have recently put upon the market some electrical specialties which are deserving of especial attention. Figure 1 is a full size illustration of the Nassau capsule battery, patents on which were granted August 19, 1890. It is a decidedly new departure in primary batteries. The following are the advantages claimed for it:

It is the smallest effective battery ever constructed, the actual dimensions being 2½ inches by ⅝ inches, while it gives an E. M. F. of over 1 volt, and a current of 2.20 amperes. It is perfectly dry, it does not require wiring, it never polarizes. The

FIG. 2.

power remains constant till the battery is exhausted, and it is a most convenient battery for testing purposes, there being absolutely no action on the elements when the circuit is open.

In figure 2 is shown the Nassau electrical bell outfit, which is very simple and complete. The bell is operated by a Nassau capsule battery concealed in the case of the push button. The battery is connected without wires, and can be withdrawn and replaced by the user instantaneously, whenever it requires renewal. The electric alarm thermometer is shown in figure 3. This alarm is sounded by a simple but very ingenious application of electricity, by which the rising or falling of the mercury to certain fixed points of heat or cold closes an electric curcuit, and instantly rings the attached bell. When no alarm is needed, as in Summer, the bell is silenced altogether by turning a switch.

The electric capsule which operates the alarm bell is in itself a new and remarkable invention, being (unlike ordinary electric

FIG. 1.

FIG. 3.

batteries) perfectly dry, needing no attention, and capable of being removed and replaced without any disconnecting or connecting of wires. It will last, so it is claimed, without any attention, for from one to three years, according to the frequency with which the alarm is sounded, and can be instantly replaced by a new capsule at nominal cost.

The alarm can, when desired, be arranged to sound at any distance from the thermometer itself, and in this way be used as an invaluable guard against the risk of fire.

Special adaptations of this thermometer, for use in breweries, malt-houses, Turkish baths, cold storage-houses, factories, etc., to control any given range of temperature, can be supplied by the patentees.

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The electric railway at Saratoga Springs, N. Y., was closed for the winter on September 15th. The road was operated only 30 days, and the business done surpassed the expectations of its projectors. The road will probably be extended to Ballston during the winter.

## Visit of the Iron and Steel Institute to Edison's Laboratory.

A large party of the members of the British and German engineering societies now visiting this country, made an interesting excursion on Friday last to the laboratory of Thomas A. Edison at Orange, N. J. Various other trips had been planned for the same afternoon, but a sight of Mr. Edison in the midst of his apparatus was evidently a drawing card, as the eight-car special train provided to take the guests out to Llewellyn Park, was packed full with nearly 500 ladies and gentlemen. The train arrived at Llewellyn shortly before two, and a short walk brought the visitors to the famous laboratory. The gates, usually kept so jealously guarded, were thrown wide open, and access to every part of the laboratory was freely accorded to the guests. The first item on the programme was an informal luncheon, served in the fine library adjoining the entrance, after which the visitors dispersed in groups to examine the various interesting features of Mr. Edison's magnificent collection of materials and appliances for original investigation.

An exhibition was given of a tool for drilling holes in iron driven by electricity, and a small electric welding plant was shown in operation, a curious feature of this being that the alternator which furnished the welding current was driven by two Edison motors. Up-stairs a number of phonographs were kept going all the afternoon, so general was the desire to test the performance of this world-renowned production of Mr. Edison. The great inventor himself, undoubtedly for many the chief attraction of the day, was here, there and everywhere, continually surrounded by a knot of admiring foreigners, many of whom engaged him in short discussions on technical points.

Mr. Edison was ably seconded in entertaining the large party of visitors by his secretary and chief assistant in the laboratory Mr. A. O. Tate. A few of the electrical men in the party spent a very interesting and instructive half hour with Mr. A. E. Kennelly, the chief electrician of the laboratory. Mr. Kennelly has charge of a large collection of the finest electrical measuring instruments in the country, having every facility for making the most accurate and hair-splitting tests that can possibly be required by the most scientifically managed company. A great deal of work is done here for the engineering department of the Edison general company, such as planning out systems of distribution for light and power plants, and sometimes exact representations are made of the wiring of a plant to ascertain by delicate test whether the conditions agree with the calulations.

It can easily be understood that the afternoon passed very quickly for the visitors, to many of whom such a large electrical establishment maintained almost exclusively for original scientific investigation must have been a very novel sight. The proceedings were quite informal throughout; a carriage drive through Llewellyn Park was organized for the benefit of the ladies, and later on in the afternoon Sir James Kitson made a short speech of thanks to Mr. Edison for having thrown open his unique establishment to the invasion of such a large body of foreigners.

At five o'clock the visitors returned to New York. Among the party were nearly all the principal members of the Iron and Steel Institute and the German Iron Trade Society. Mr. Alexander Hollingworth, one of the proprietors of our well-known contemporary *Engineering*, and Mr. J. F. Albright of R. E. Crompton & Co., were the best known representatives present of British technical journalism and electrical engineering.

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The Law Telephone Company, 85 John street, this city, have recently sent out some very tasty printed matter relating to the Law battery, the Bailey current regulator, and their other specialties. The Law battery has been on the market for over nine years, and its large sales prove it to be one of the most popular ever offered.

## Some Novel Electric Fixtures.

For the general cases of electric lighting in stores, halls or dwellings, a large variety of designs have been brought out by various firms. These comprise both combination fixtures and electroliers in almost every style, and would seem at first sight to cover the field. But as far as artistic fixtures are concerned, a marked need has long been felt for some that would be adapted to places

with low ceilings. Such cases were generally met by shortening up an ordinary fixture, or bending its arms upward so as to take up less room.

Mr. E. R. Crolius, who looks after the fixture department of the Great Western Electric Supply Company, has come to the rescue with a number of new designs which speak for themselves. The cluster shown with a

"sun-plate" gives a pleasing effect with almost any style of colored or etched globes, and the four-light "twist" electrolier is thoroughly novel in design. The same holds true of the two forms of "husks" which we illustrate, these being well suited for use at either end of the cars. The same fixtures are adapted to hallways, kitchens or any other place where the ceilings are too low

for the average fixture. Moreover, one of the "husks" shown makes a neat bracket for use over a desk, and a ceiling or wall studded with the other form would be in keeping with the plans of modern decorators. Visitors invariably pronounce them the handsomest of their kind, a verdict well borne out by the orders received from many who have an eye for the beautiful.

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The suit of the Electric Improvement Company against the San Jose and Santa Clara Railway Company was decided at San Jose, Cal., by the jury bringing in a verdict that neither party recover anything. The suit was for $18,000 for material furnished, and the defendant had made a counter-claim of $100,000 for alleged damages. The material was furnished for the old Fisher Underground Electric Railway system.

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The Schuyler Electric Company, Middletown, Conn., have installed a 100 light plant in the American Institute Fair in this city, which opened on October 1st. The plant consists of two 50-light dynamos, with regulators and complete station equipment, and 100 full arc lamps.

## Book Notices.

"Rules and Forms of the Canadian Patent Office" is just what the title indicates, and is a handy volume for inventors or others interested in Canadian patent office practice.

"European Patents. A Manual of Information and Charges," has been sent us by the International Patent Soliciting Company of this city. It is "exclusively for solicitors."

"The Veiled Prophet, of St. Louis," has deigned to command the presence of the ELECTRICAL REVIEW at his annual jubilee to be held this month. The invitation is

one of the handsomest bits of design and color printing we have ever seen. His royal majesty is to be congratulated upon having a good press agent so loyal to him.

"Technology Quarterly," for August, 1890, has been received. It is a publication which fairly teems with scientific knowledge. Its contributors are for the most part, professors, instructors, and students in the Massachusetts Institute of Technology, Boston. This journal, therefore, represents probably the latest researches into theoretical and applied science available.

"The Brooklyn Institute Prospectus for 1890-91" has been received. The course of lectures on electricity to be given during the year is very comprehensive and interesting, and is worthy the careful consideration of those interested. Most of the lectures and meetings will be held in the hall and rooms of the Young Men's Christian Association building, 502 Fulton street, Brooklyn, until the Institute building is repaired.

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## A Very Successful Buffalo Road.

The Park electric system of the Buffalo Street Railway Company has been doing some remarkable work this summer. Four cars are running on this branch, a distance of about one and three-quarter miles. The traffic on pleasant Sundays is extremely heavy, and each car is required to draw two trailers for a large portion of the day. Under these circumstances the following figures will be of interest:

On July 16th, the road carried 17,000 passengers; July 20th, 8,000; July 27th, 11,000; August 3d, 5,000; August 10th, 9,000; August 17th, 3,000; August 25th, 10,000. On August 3d, the day was cold and disagreeable; on August 17th, the weather was cold and rainy, which accounts for the small number of passengers carried.

This road is equipped upon the Edison System and has been in operation now for about 15 months, with remarkable results; the repair bills have been merely nominal, although the service called for has been excessive, particularly in the summer. The largest load ever carried was a little over 20,000, the occasion being a large picnic, and the time being two days after the road commenced operation, in July, 1889. But three motor cars were in service on that day, and this remains, probably, the greatest record ever made by an equal number of cars.

## KINDRED INTERESTS

**The Universal Radial Drill Company,** Cincinnati, are out with their usual monthly calendar containing a lithograph of one of their machines.

**R. T. White,** of Boston, expects to be present at the Buffalo Convention of the American Street Railway Association, with a full line of his street railway supplies and specialties.

**The Atlas Engine Works,** Indianapolis, Ind., have sent us a beautiful catalogue of their engines and boilers. It is thoroughly illustrated and printed very artistically in two colors. Over 7,000 of their engines are in daily service.

**The Jewell Belting Company,** Hartford, has given a great deal of valuable information about the care of belts in a little booklet recently issued. Rules and tables relating to the transmission of power by belting occupy considerable space.

**The James Kempster Printing Company,** 56 Cedar street, New York, have gotten up a calendar for 1890–91 in their usual artistic manner. The figures are plenty large enough for near sighted editors and human beings to see across the room.

**The McCreary Electrical Specialty Company,** 18–20 Cortlandt street, New York, have sent us a copy of their illustrated price list. Their silvered reflectors, half-shades, and other neat devices, are meeting with ready and rapid sales. Another catalogue of specialties is in preparation.

**The Consolidated Electric Storage Company,** of this city, are doing a famous business in the secondary cells manufactured by them. A representative of the ELECTRICAL REVIEW was recently shown their record book, which exhibited the fact that at least one order for batteries had been booked every day during the month of September.

**The Tripp Manufacturing Company,** of Boston, will be represented at the Street Railway Convention, to be held at Buffalo this month, and will have on exhibition a large model of their standard electric trucks, which is meeting with such favor with the street railway companies. The model will be equipped with the Tripp anti-friction journal bearings.

**W. R. Fleming & Company,** 174 Fulton street, New York City, have been very busily engaged in the installation of numerous electric light plants. Representing the "Ide" and "Ideal" engines, manufactured by foundry and machine department, Harrisburg, Pa., and having consequently both center and side crank engines of the same inerit and make to present to purchasers, they have found some advantage, as their business record shows, over their past position in the sale of side crank engines only. Probably one of the showiest plants in New York City is being installed by them for running an Edison incandescent plant for the Hotel Marlborough at 36th street and Broadway. Two 80-horse power self-oiling Ideal automatic engines will be the present engine equipment there. Contracts have just been made for engines of this style for the following well-known concerns: ferry boat "New Brunswick," 40 horse power; Messrs. Fleichmann & Company, New York, 30 horse power; Messrs. Browning, King & Company, New York, two 50 horse power (sixth order); Edison Electric Company, New York, one 50 horse power; Pennsylvania Railroad Company, one 40 horse power; Standard Oil Company, Jersey City, one 70 horse power; C. H. Blanchard, New York, two 80 horse power; Johns-Pratt Company, Hartford, Conn., one 70 horse power. A number of large boiler plants have also been installed in the following towns: Providence, R. I.; Martinsburg, W. Va.; New York City; Fort Worth, Texas; Cordele, Ga., and Montgomery, Ala.

**The Eureka Tempered Copper Company,** of North East, Pa., is in receipt of the following testimonials, which are self-explanatory:

FEDERAL STREET & PLEASANT VALLEY PASSENGER RAILWAY COMPANY.

ALLEGHENY, PA., Aug. 29th, 1890.

Eureka Tempered Copper Co.,
North East, Pa.

Gentlemen—In reply to your inquiry concerning our experience with tempered copper, would say that after a year's use, we can heartily endorse it, and recommend it for all descriptions of bearings, and for electrical purposes, such as commutator bars, trolley wheels, etc., etc. Respectfully yours, WM. M. RAMSEY, Asst. Supt.

OAKLAND OFFICE PITTSBURGH TRACTION COMPANY.

PITTSBURGH, PA., Aug. 29, 1890.

Eureka Tempered Copper Co.

Gentlemen—I have great pleasure in being able to testify to the excellent quality of your tempered copper. We have been using a guide show made of it on a 500 horse-power Corliss engine, for the past six months; it looks as well to-day as when we put it on. We are also using your metal for connecting rod boxes, on a 35 horse power Ball engine, making 300 revolutions per minute. We find it takes much less oil than any other metal we have used, and runs much cooler. We intend equipping all our engines with your tempered copper. Yours, etc., E. W. DAVIS, Supt.

**The Accumulator Company,** of this city, is in receipt of the following self-explanatory letter:

ELLERSLIE, RHINECLIFF-ON-HUDSON, September 11th, 1890.

D. H. BATES, ESQ.,
Vice-Prest. and Gen. Manager,
The Accumulator Co., New York.

*Dear Sir:* In reply to your inquiry respecting the electric lighting on Mr. Morton's place, I beg to say that the plant has been in operation for over two years, and is in as good condition to-day, apparently, as when first installed. It has given no trouble whatever, outside of ordinary care, and has cost practically nothing for repairs. The lights have given entire satisfaction and the accumulators have never failed to furnish the required energy.

This system of lighting compares very favorably with gas in point of economy, and has the advantage of being free from smoke and heat, besides affording a most agreeable light. There is a large saving, as compared with the cost of running the engine all the time, in labor, fuel and wear and tear on the machinery.

In other words, Mr. Morton has found the system very satisfactory in every way.

Very respectfully,
B. W. PHILBRICK, Engineer.

### Fort Wayne Electric Club.

The Fort Wayne Electric Club held an interesting and largely attended meeting on October 3d. State Senator Robert C. Bell acted as chairman, and prophesied great achievements for electricity. Professor Kimball, electrical engineer of the local company, spoke on "Electric Light, Heat and Power." Mr. Marmaduke M. M. Slattery made an address in his usual brilliant style, and gave some practical illustrations of electric cooking.

### An October Tour of Interest.

Almost everyone is commenting on the rapid advance the near South has made the past few years, yet comparatively few New Yorkers have visited these fields of modern awakening and growth almost at their very door. On Thursday, October 9th, one of the Pennsylvania Railroad Company's personally-conducted tours will leave New York at 8.00 A. M., Philadelphia 10.30 A. M., in a special train, and take in one of the most interesting circuits a tourist could desire. The Caverns of Luray, the battlefields of Gettysburg, Virginia's Natural Bridge, the Grottoes of the Shenandoah, and the cities of Richmond and Washington will "be done" thoroughly. The entire trip, including every necessary expense, is included in the $52 for the ticket from New York and $50 from Philadelphia, and a tourist agent and chaperon will accompany the party throughout. An itinerary, descriptive of the tour, and all information will be furnished by addressing W. W. Lord, tourist agent, 849 Broadway, New York,

### FINANCIAL.

Closing quotations of electric stocks, from F. Z. Maguire, Electrical Securities, 18 Wall street, N. Y., Saturday, October 4, 1890. New York, Boston and Washington Stock Exchanges.

| | |
|---|---|
| **NEW YORK.** | |
| Western Union Telegraph Co. | 81⅛. |
| Edison General Electric Co. | 94. |
| " " " Deferred | 55. |
| Consolidated Electric Light | 59. |
| Edison Electric Illuminating Co. | 70. |
| United States Electric Light | 30. |
| **BOSTON.** | |
| Thomson-Houston Electric Co. | 50⅛. |
| " " " Preferred | 26. |
| " " " Series C | 11¼. |
| " " " Series D | 6. |
| " " International | |
| " Welding Co. | 200. |
| " European Welding Co. | 77. |
| Ft. Wayne Electric Co | 111¼. |
| TELEPHONE: | |
| American Bell | 220. |
| Erie | 48. |
| New England | 51⅛. |
| Mexican | .80 |
| Tropical American | |
| MISCELLANEOUS: | |
| Edison Phonograph Doll | 1⅛. |
| **WASHINGTON.** | |
| Pennsylvania Telephone | 25. |
| Chesapeake and Potomac | 72. |
| American Graphophone | *14⅞. |
| United States Electric Light (Washington) | 155. |
| Eckington and Soldiers' Home Railway | 62. |
| Georgetown & Tenallytown | 53½. |
| **PITTSBURGH.** | |
| Westinghouse Electric Mfg. Co | 34. |

*Ex. Dividend.

### PERSONAL.

IF CHARLES W. DAVIS, late Manager of the Telephone Exchange, at Kearney, Neb., and who gave up his position there in July, '89, or if any one cognizant of his whereabouts, will communicate with the undersigned, something may be learned to the advantage of said Davis.

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## ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENTS OF THE UNITED STATES WERE ISSUED ON SEPTEMBER 30, 1890.

437,183 Electric meter; Richard N. Dyer, East Orange, N. J.

437,210 Electric street car; Luther H. Lebed Pittsburgh, Pa.

437,226 Electric illuminated letter; James A. McEntee, Chicago, Ill.

437,259 Electric motor gearing; Jos. J. Sprague, Carthage, Mo.

437,272 Distribution and regulation of electric currents; Frank Wilking, Berlin, and Hermann Miller, Nuremberg, Germany.

437,307 Automatic telegraphy; David Kunhardt, Aachen, Germany.

437,324 Electric cut-out; Elmer E. Bailey, Everett and Geo. J. Galeraith, Boston, Mass.

437,330 Electric cable; David Brooks, Jr., Philadelphia, Pa.

437,352 Electric hand-switch; Joseph W. Battershall, Attleborough, Mass.

437,358 Electric railway systems, Chas. K. Harding, Atlantic, Ia.

437,359 Electric snap-switch. 437,360 Dynamo electric machine: Wm. Hochhausen, Brooklyn, N.Y.

437,362 Electric cut-out; Wm. J. Jenks, Nyack, N. Y.

437,363 Lighning arrester; Harry M. Kalbach, Ashland, Pa.

437,369 Electric alarm; Arnold Tschira, Freiburg, Germany.

437,393 Galvanic battery; Edward H. Crosby, Boston, Mass.

437,422 Telegraphy; Thomas A. Edison, Menlo Park, N. J.

437,423 437,424 Phonograph. 437,425 Phonograph holder. 437,428 Propelling device for electric cars. 437,429 Phonogram blank; Thomas A. Edison, Llewellyn Park, N. J.

437,437 Method of making phonogram blanks; Thomas A. Edison, Orange, N. J.

437,445 Conduit for underground wires; Thomas M. Morton, Baltimore, Md.

437,469 Galvanic battery; Gustave A. Liebig and Chas. Williams, Baltimore, Md.

437,501 Electric generators; Wm. M. Mordey, Lambeth, England.

437,502 Arc lamp; John A. Mosher, Abilene, Kan.

437,507 Petroleum or oil motor engine; Nicolaus A. Otto, Cologne.

437,510 Telegraph key; Authur F. Purdy, Lawrence, Cal.

437,512 System of electrical distribution; Frank B. Rae, Chicago, Ill.

437,513 Electrical switch. 437,661 Motor truck for electrically propelled vehicles. 437,662 Automatic switch for stationary motors. 437,663 Armature for dynamo electric machines and motors; Frank B. Rae, Detroit, Mich.

437,516 Switchboard for electric lighting system; Robert F. Sawyer, Chicago, Ill.

437,535 Motor truck for electric railway cars; Chas. J Van Depoele, Lynn, Mass.

437,568 Electric conductor; Edward Clark, Newburg, Orange Co. N. Y.

437,570 Welding metals electrically. 437,571 Process of electrically welding metals; Chas. L. Coffin, Detroit, Mich.

437,613 Switch for the moving contacts of electric railways; John W. Murray, Saginaw, Mich.

437,624 Mechanical telephone; James M. Russell, Anderson, Ind.

437,632 Insulated wire; Chas. F. Splitdorf, New York.

437,654 Electric forging apparatus; Geo. Laudet and James H. Simpson, Pittsburgh, Pa.

437,667 Electrical switch; Lucius T. Stanley, Brooklyn, N. Y.

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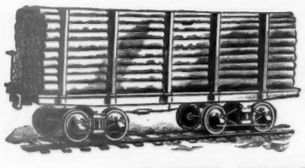

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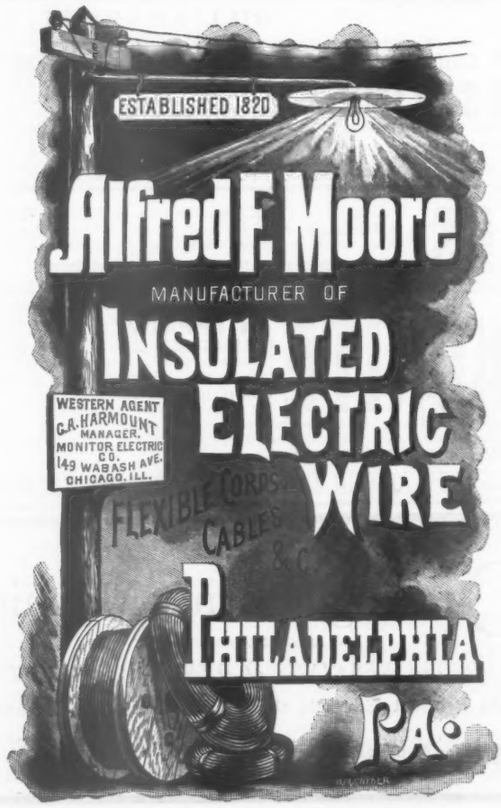

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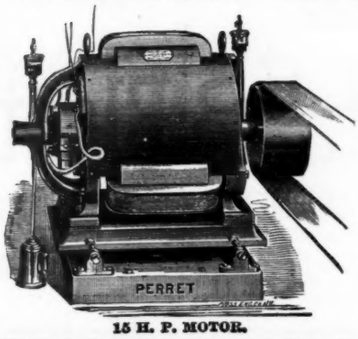


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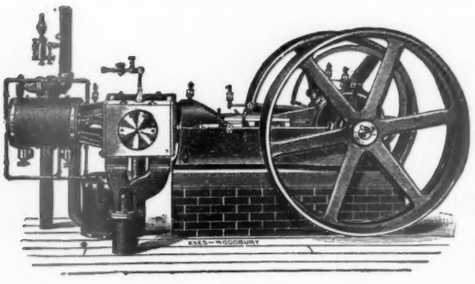

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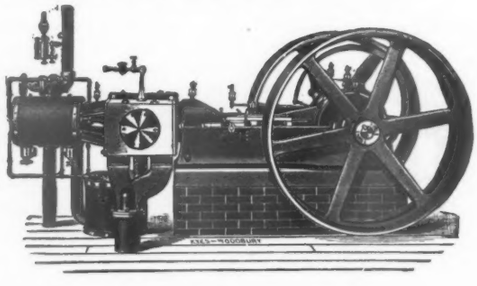

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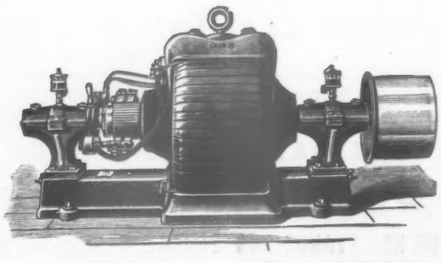

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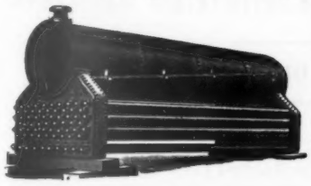

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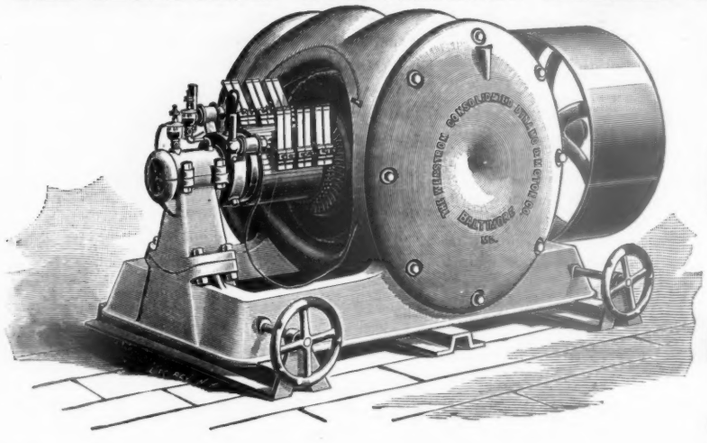

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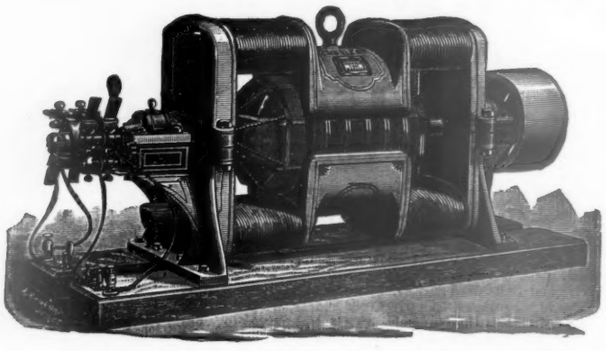

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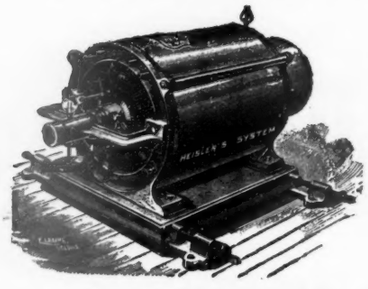

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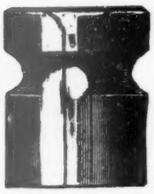

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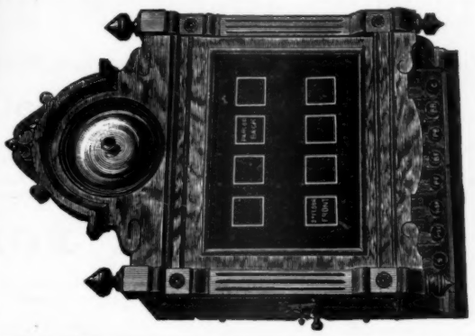

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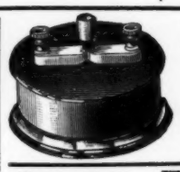

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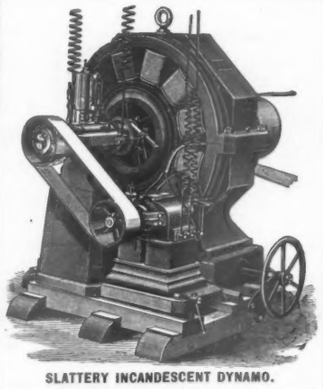

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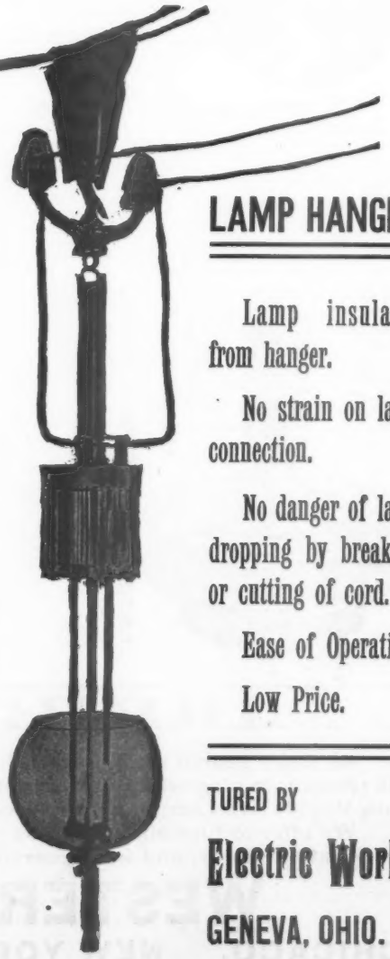

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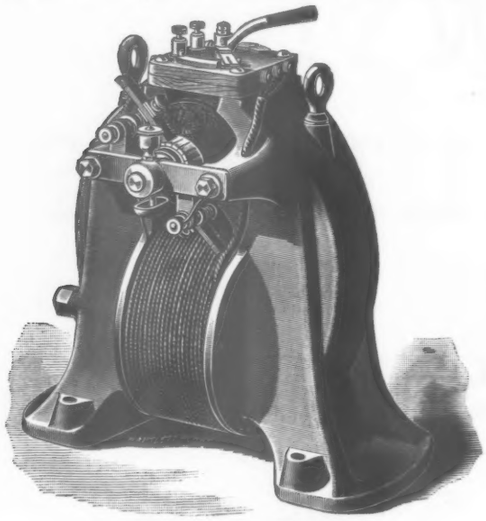

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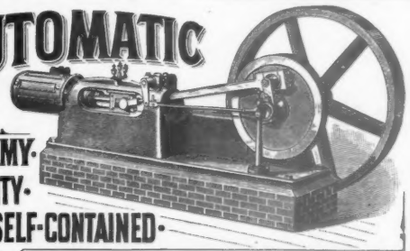

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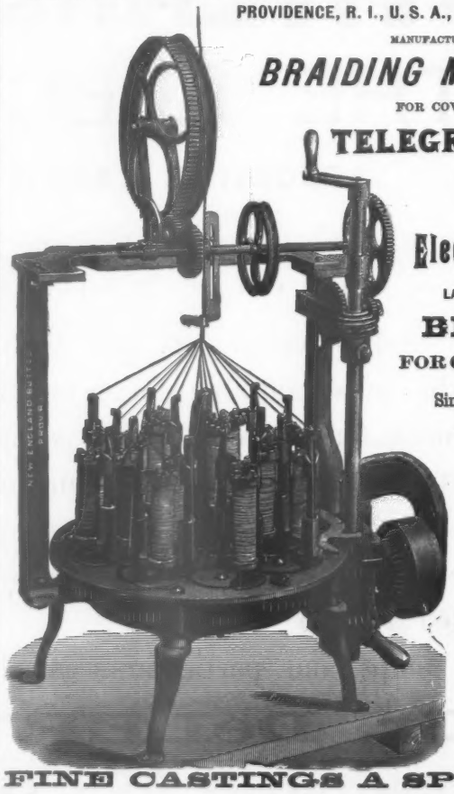

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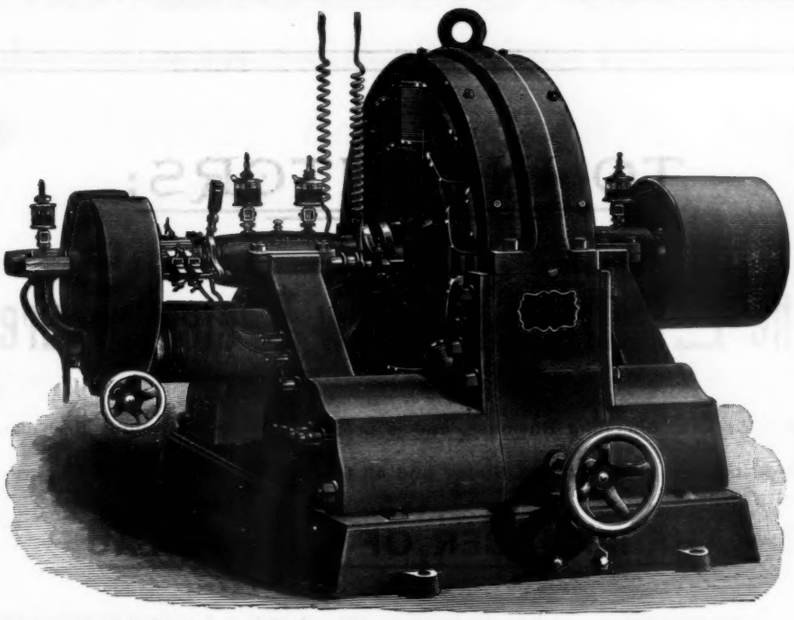

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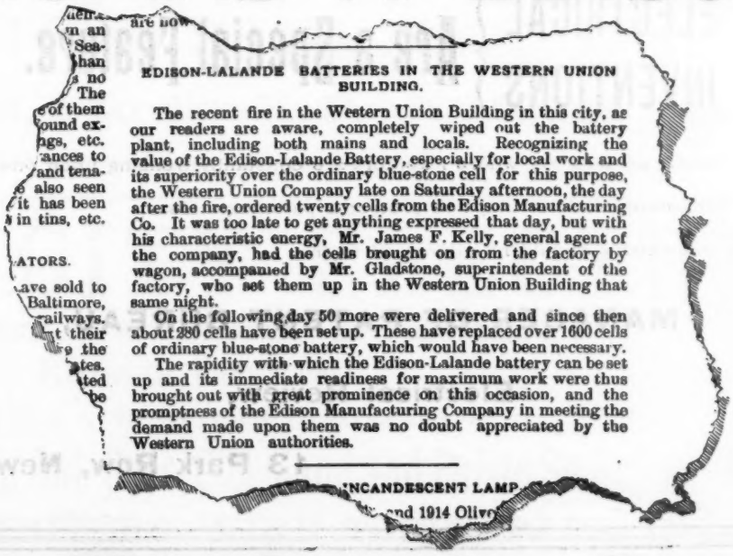

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The recent fire in the Western Union Building in this city, as our readers are aware, completely wiped out the battery plant, including both mains and locals. Recognizing the value of the Edison-Lalande Battery, especially for local work and its superiority over the ordinary blue-stone cell for this purpose, the Western Union Company late on Saturday afternoon, the day after the fire, ordered twenty cells from the Edison Manufacturing Co. It was too late to get anything expressed that day, but with his characteristic energy, Mr. James F. Kelly, general agent of the company, had the cells brought on from the factory by wagon, accompanied by Mr. Gladstone, superintendent of the factory, who set them up in the Western Union Building that same night.

On the following day 50 more were delivered and since then about 280 cells have been set up. These have replaced over 1600 cells of ordinary blue-stone battery, which would have been necessary.

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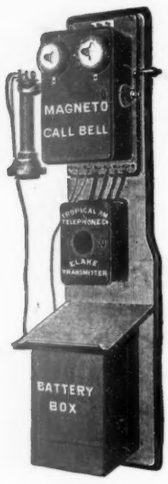


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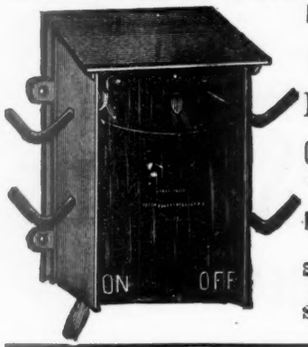


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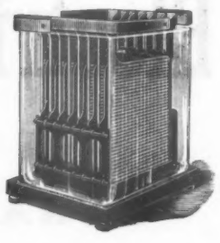

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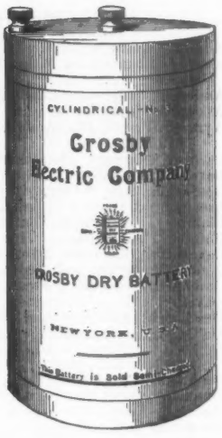


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